NFPA 70E ARC-FLASH REPORT

Prepared for:

Delaware County Regional Sewer District

50 Channing Street

Delaware, Ohio 43015

Prepared by:

EDG CONSULTING ENGINEERS

TABLE OF CONTENTS

INTRODUCTION 1

SYSTEM MODELING 2

DATA COLLECTION 2

SOFTWARE 4

ASSUMPTIONS AND CLARIFICATIONS 5

AREAS OF EXTREME DANGER 12

PERSONAL PROTECTIVE EQUIPMENT ANALYSIS.....13

SAFE WORKING METHODS AND RECOMMENDATIONS.....15

LABELING 17

ELECTRICAL SAFETY POLICY AND THE LOCKOUT/TAGOUT PROCEDURE.....21

SUMMARY 22

GLOSSARY.....24

APPENDICES

APPENDIX A Data used for completion of Study
APPENDIX B Utility Fault Current Data
APPENDIX C Operating Scenarios Used for Analysis
APPENDIX D Multilabel Equipment
APPENDIX E Areas Of Extreme Danger
APPENDIX F Over-Dutied Equipment
APPENDIX G Onelines and Simple Report
APPENDIX H AFHLR

INTRODUCTION

EDG, Inc. (EDG) performed an NFPA 70E Arc-Flash Hazard Analysis at Delaware County Regional Sewer District's OECC Facility, Tartan Facility, and Scioto Facility located in Delaware County, Ohio. This study was conducted from June 2011 to September 2011.

The purpose of this study was to calculate the amount of energy available in case of an arc-flash and recommend a sufficient level of personal protective equipment (PPE) while working on energized electrical equipment. Three hundred and twenty (320) total pieces of equipment were identified as having the potential to be worked on while energized, so we have calculated arc-flash energies, developed Energized Electrical Work Permits (EEWPs), and prepared labels for this equipment. Note: The OECC facility had 255 labels (84 for MS1, 171 for MS2 & MS3), Tartan Facility had 29 labels, and Scioto had 36 labels.

This arc-flash study, including all assumptions, recommendations, EEWPs, and PPE determinations, should be an integral part of your facility's electrical safety program. It should be emphasized that **the safest way to work on electrical equipment is while it is de-energized**.

SYSTEM MODELING

DATA COLLECTION

This report is based on information provided by Delaware County Regional Sewer District and collected during a site visit. This includes one line diagrams, floor plans, circuit breaker and relay setting sheets, and details of the electrical power distribution system of the facility. Specific data used to calculate the potential arc-flash hazards includes: equipment locations, wire size and type, raceway size and type, distance from source to load, bus sizes, switchgear, motor control center (MCC) and panelboard arrangements, and utility source information. The results of this study and the calculations herein rely on this data being accurate. A summary of the equipment used to complete the study can be found in Appendix A.

Utility short circuit information was also obtained and can be found in Appendix B. The utility companies have given different scenarios each based upon circuit conditions and distribution lines being in or out of service. This is important to note since arc-flash calculations are derived from the magnitude and duration of short circuit current in a fault. For this study in particular the lowest short circuit value was compared to the highest. Experience and studies have shown that smaller magnitude faults many times yield higher values for arc-flash. This is because although a larger magnitude fault will yield a higher value per electrical cycle, the number of electrical cycles is greatly shortened by upstream over current protection devices (OCPD) clearing the fault. Smaller magnitude faults yield lower values per electrical cycle but have a much longer duration due to delayed clearing time of upstream over current protection devices.

EDG obtained data from the following OECC provided drawings:

- Burgess & Nipple Engineers Architects
  Delaware County, Ohio
  Olentangy Environmental Control Center Expansion
  ELECTRICAL SITE PLAN Sheet No. 91 of 112
  Record Drawing 12/98

- Burgess & Nipple Engineers Architects
  Delaware County, Ohio
  Olentangy Environmental Control Center Expansion
  ELECTRICAL ONE LINE POWER DIAGRAM Sheet No. 92 of 112
  Record Drawing 12/98

- Burgess & Nipple Engineers Architects
  Delaware County, Ohio
  Olentangy Environmental Control Center Expansion
  ELECTRICAL ONE LINE POWER DIAGRAM Sheet No. 93 of 112
  Record Drawing 12/98
- Burgess & Nipple Engineers Architects
  Delaware County, Ohio
  Olentangy Environmental Control Center Expansion
  ELECTRICAL ONE LINE POWER DIAGRAM Sheet No. 94 of 112
  Record Drawing 12/98
- Malcolm Pirnie
  Delaware County Regional Sewer district
  Delaware County, Ohio
  Centrifuge Dewatering Facility Improvements
  DEWATERING FACILITY ONE-LINE DIAGRAM AND MCC ELEVATION E Sheet 03 of 10 June2008
- Malcolm Pirnie
  Delaware County Regional Sewer district
  Delaware County, Ohio
  Centrifuge Dewatering Facility Improvements
  SLUDGE THICKENER BUILDING ONE-LINE DIAGRAM AND MCC ELEVATION E Sheet 06 of 10 June 2008
- Burgess & Nipple, Limited Consulting Engineers
  Delaware County, Ohio
  Olentangy Environmental Control Center
  ELECTRICAL ONE LINE POWER DIAGRAM Sheet 69 of 75
  Record Drawing JAN, 1981

Additionally OECC personnel provided field data obtained by visual observations.

SOFTWARE

The results of this report have been generated using ESA's EasyPower® Power Engineering Software Version 9.0, which is based on the National Fire Protection Association (NFPA) 70E-2009 and IEEE 1584-2002. EasyPower® can calculate results using equations from both standards. This provides the most reliable and accepted means, determined by the industry, of evaluating electrical hazards and determining the appropriate Personal Protective Equipment (PPE) to mitigate electrical arc-flash risks.

These calculations are based on the impedance of electrical components as well as the actual trip characteristics of the over current devices in the electrical system. EasyPower® uses an extensive library of industry standard circuit breakers and fuses to obtain the most realistic and accurate results.

As equipment is entered into the software, the reactance and resistance, or total impedance, is calculated for each equipment type. Some use manufacturer nameplate data while others use typical values that are published and put out by the IEEE. For instance, as conductor information is entered into the software, the reactance and resistance of the cable is calculated based upon criteria such as conductor size, insulation type, and length of conductor. This combination of data gives a total per foot impedance.

When a full electrical system is modeled in EasyPower®, each branch of the system where a fault may occur can be broken down into its equivalent impedance based upon each piece of equipment in that branch of the system. These values, along with trip characteristics of over current devices, are then used to show current flow characteristics in a faulted situation. For buses less than 1 kV, 100% and 85% of the calculated arcing current was looked at.

Analysis was run with maximum times set to 2 seconds for all buses at or below 1 kV and 5 seconds for buses greater than 1 kV. IEEE 1584-2002 states "It is likely that a person exposed to an arc flash will move away quickly if it is physically possible and two seconds is a reasonable maximum time for calculations". Five seconds was used for voltages over 1 kV as a precautionary measure.

ASSUMPTIONS AND CLARIFICATIONS

Questionable data has been researched to determine to the extent possible unknown or ambiguous values. It is important for your facility's personnel to review the report provided and confirm that it is accurate. This arc-flash study only includes the information as shown on the one line diagram. Some of the data used to complete the study was based on typical values, such as the X/R ratios for the transformers and motors. Using the typical values will not have a major effect on the short circuit current values, and therefore will not substantially affect the arc-flash energy.

The following are assumptions of the electrical system used by EDG to perform the arc-flash study.

Reliability of Equipment

- Reliability of equipment is not taken into account in this study. The results of this study are based upon tested manufacturer data and assume that equipment is in proper working condition to clear a fault. All over current protection devices such as circuit breakers, contactors, relays, etc. should be properly tested and maintained on a regular basis.

Cables

- All cables were assumed to be in steel conduit unless otherwise specifically noted on the drawings. Frequent spot checks were performed throughout the plant to verify this assumption.
- Many cable sizes could not be verified due to the equipment being live during inspection. These were estimated from the fuse and/or load size. This should have a negligible effect on the results.
- The data for the quantity and size of cables from the Utility transformer to MS-1 was found to be conflicting. The data provided by OEEC personnel indicated one 1/C 600KCMIL per phase. Burgess & Nipple, Limited Consulting Engineers drawing titled Delaware County, Ohio, Olentangy Environmental Control Center, ELECTRICAL ONE LINE POWER DIAGRAM Sheet 69 of 75, Record Drawing JAN, 1981 indicated three 1000KCMIL per phase and three 1000KCMIL per neutral. The data indicated by the drawing was used.
- The data for the quantity and size of cables from the Utility transformer to MS-2 was found to be conflicting. The data provided by OEEC personnel indicated six 1/C 600KCMIL per

phase. Burgess & Nipple Engineers Architects drawing titled Delaware County, Ohio, Olentangy Environmental Control Center Expansion, ELECTRICAL ONE LINE POWER DIAGRAM Sheet No. 93 of 112, Record Drawing 12/98 indicated four 500KCMIL per phase. The data indicated by the drawing was used.

Motor Control Centers

- Motors connected to an MCC were grouped into two separate loads. One group for motors greater than 50 hp and one group for motors less than 50 hp, unless they had an electrical component requiring a label such as a disconnect switch or motor starter. The largest motor in each group was entered into the software separately. Feeders to grouped motors were not entered. This approach is consistent with guidelines given by EasyPower®.
- It is assumed that all breakers within MCC's have an interrupting rating appropriate to the MCC they're housed in, i.e. greater than or equal to the MCC's interrupting rating. The same goes for all switchgear, switchboards, panelboards, etc. If this is not the case, the duty report shown in Appendix F may not be accurate.

Junction Boxes/Splitters

- Many locations throughout the plant were fed through splitters or junction boxes. Typically these were used only for housing conductors and terminal blocks. These were not labeled due to the assumption that they will never be worked on while energized.

Transformers

- Arc-flash energy calculations for transformers were excluded from the arc-flash study due to the assumption that transformers will not be worked on while energized.

Panelboards

- Panels (and other devices) below 240V connected downstream of transformers smaller than 125 kVA do not have enough energy to sustain an arc as specified by IEEE 1584. These devices were excluded from the arc-flash analysis.
- Panelboards, as with MCC's, are assumed to contain circuit breakers and other devices with appropriate interrupting ratings. If this is not the case, the duty report in Appendix F may not be accurate.

Termination Boxes

- Termination boxes were excluded from the arc-flash calculations based upon the assumption that they would not be worked on while energized.

Capacitors

- Arc-flash energy calculations for capacitors were excluded from the arc-flash study due to the assumption that capacitors will not be worked on while energized.
- Capacitors were not modeled because they discharge too quickly to have an effect on breaker clearing and therefore will have no impact on duty calculations in accordance with IEEE Std. 551-2006 (Violet Book).

Power Source

- The analysis was performed conservatively. This facility has a single source of power. If the amount of power varies, the resulting arc energies may differ from the results of this report. In many cases, **arc-flash hazards will be increased** with less incoming power. The arc-flash values have been calculated using different scenarios incoming utility power. These values were then compared and the most conservative values were taken. The scenarios are detailed in Appendix C.

Grouped Equipment

- In some cases, equipment with multiple components was grouped to comprise a complete system.
- For the cases where multiple enclosures constitute a complete system, one label has been provided for the group of equipment. This requires that the maintenance personnel be familiar with the system before performing maintenance.

Multiple Labels for certain equipment with Main breakers

- In some cases a second label is provided for gear with a main breaker in a separate cubicle. For better clarification, multi-label equipment is described in detail in Appendix D.

Utility

- The utility was contacted to find out the available fault current. This information can be modeled in several ways including available MVA, kA, impedance or per-unit impedance. See Appendix B for specific data provided by the utility. In order to realistically model the

system, the nominal utility value was also modeled at ±25%, as documented in Appendix C. The most conservative resulting numbers were used for the final report.

ARC-FLASH HAZARD ANALYSIS

The results of this study and the associated reports herein are based on our interpretation of both NFPA 70E and IEEE 1584 using a conservative approach, engineering judgment, and experience in order to apply a conservative level of protection. **The final results are based on a comparison of multiple scenarios as previously noted and the worst case value according to a cross check between IEEE calculations *for each scenario* and NFPA 70E calculations *under valid conditions*.** All values are based on three phase faults. In the case of an arc being initiated by a phase to ground fault, it quickly escalates into a three phase fault. This fact has been established by IEEE through testing, and is the recommended modeling approach in the IEEE 1584 standard.

The arc-flash results are based on empirically derived equations derived from statistical analysis and curve fitting results. The test results can be affected by many factors including: humidity, barometric pressure, temperature, arc distance, and other variables. These variations are affected by the actual system conditions such as the motors that are in operation, as well as the actual utility voltage level. Because of their unpredictability, the equations used to model arcs are not perfect.

The recommendations in this report cannot guarantee personal safety. However, the recommendations do provide a potentially better evaluation of the existing electrical system based on the present best practices recommended for personal protection in the workplace.

This report includes all of the equipment as shown on the electrical one line diagram. Not all of the remote panelboards, loads, and motor contributions were included in this study. Deeper into the electrical system, it is easier to take a smaller subsystem out of service for repair or maintenance than it is to take a major one out.

It is important to know that the available plant short circuit current affects the arc-flash values generated in this report. The amount of fault contribution from a motor is constant based upon name plate data. Motor loading has a minimal affect on fault contribution and the variance is neglected when calculating short circuit values. The addition of motors, especially those over 50 hp, that are added to production will contribute to the fault current levels. These changes could affect the arc-flash calculations. The NFPA 70E-2009 **requires** that the analysis be updated

when any major modification or renovation takes place, or a minimum of five years. Updating the arc-flash study periodically will confirm the values in this report and identify any changes in PPE required.

It is possible that the short circuit currents are above the interrupting duty rating of some of the equipment shown on the one line diagram. A piece of equipment trying to clear a fault that is larger than the interrupting duty rating could fail to open and therefore not clear the fault. It is possible that the equipment could explode and injure nearby personnel. An investigation or study of the interrupting rating of the electrical equipment was not a part of the scope of work; however, a report is provided showing the fault current at each piece of equipment modeled for the arc-flash audit. The owner is urged to review this report carefully and to take appropriate action to correct the discrepancy between the short circuit currents and the interrupting duty ratings.

NFPA 70E-2009 requires owners to keep their One Line Diagram up-to-date. Keeping the one line diagram current and accurate is a requirement in order to correctly identify the sources of power to equipment. If the plant's electrical system changes, EDG recommends updating the arc-flash study. Results of the new study may require new arc-flash warning labels, different PPE equipment, and updated Energized Electrical Work Permits.

IEEE 1584 equations are applicable for systems with Voltages in the Range of 208V – 15,000V, three phase power. **The IEEE 1584 does not cover single phase AC systems or any kind of DC system.** We have taken a conservative approach identifying arc-flash values at the line side of the DC system where it is fed from a three-phase AC system. Since there are no standards available to model and calculate arc-flash energy produced by a DC system, we recommend that the equipment not be worked on while energized. The same principle applies for equipment above 15,000V. For cases where the voltage is over 15,000V, the Lee Method, a theoretically derived model developed and published by Ralph Lee in 1982, may be applied. Since this is beyond the tested scope of the IEEE 1584 standard, we have taken a stance not to include equipment at these voltage levels. Our recommendation is to de-energize before performing any maintenance or work on this equipment.

At each bus, the bolted fault current is calculated, which is then used to calculate the arcing fault current. Using 100% and also 85% of the arcing fault current, the tripping time of the upstream

OCPD is calculated. The magnitude of the arc-flash fault current and the corresponding trip time is then used to find the arc-flash incident energy. There are times when 85% of the arc-flash fault current results in a higher arc incident energy due to the increased trip time of the upstream OCPD. By evaluating the arc-flash energy at 100% and 85% of the arc-flash current, we introduce a factor of safety to account for variables in system operation, utility fault current contribution, temperature, humidity, and other dynamic characteristics that can affect the amount of energy released in an arc-flash event.

For fused switches and disconnect switches, the arc-flash energy is based upon the clearing time of the OCPD upstream of the switch. Due to the potential for exposed conductors on the line side of the fused switch or disconnect switch, a fault occurring on the line side of the switch would be cleared by the OCPD located upstream. This conservative method of analysis results in higher arc-flash energy.

The same method of analysis applies to motor control centers. Cubicles containing the main breaker for an MCC will have a different arc-flash incident energy rating than the rest of the MCC cubicles due to the potential for a fault on the line side of the main breaker. A fault occurring at this location would be cleared by the OCPD located upstream of the MCC.

AREAS OF EXTREME DANGER

Anytime areas of extreme danger are going to be accessed exposing current carrying conductors, the presence of electricity should be eliminated. Areas of extreme danger are beyond the realms of PPE and are not permitted for energized work according to the NFPA and OSHA. Equipment with an extreme danger rating can be found in Appendix E.

Substations, Switchgear, MCC's, and Panelboards fed by a transformer.

Many of the extreme danger locations are switchgear lineups, MCCs, and panelboards fed by transformers. Since there is no over current protective device between the transformer and main breaker or fuse, the enclosure housing the main breaker or fuse is labeled as an extreme danger location. While the main breaker will limit arcing current if the fault is downstream, there is the possibility of a fault in the incoming lines which relies on the transformer primary over-current protective device to clear the fault. In some cases a second label is provided for gear with a main breaker in a separate cubicle. The hazard level is higher when working in the main cubicle than the rest of the feeder breaker cubicles or buckets since the incoming arc-flash value is used for the main. This is very important and the maintenance personnel must be trained properly to understand how the equipment is labeled. This is explained in detail in Appendix D.

PERSONAL PROTECTIVE EQUIPMENT ANALYSIS

The information contained in the Arc-flash Hazard Reports, the Energized Electrical Work Permits, and on warning labels identifies the required level of PPE.

The working distance is a critical piece of information. The working distance is the distance between the possible arc point and the worker's head and torso. 18 inches, which is based on the average arm length of workers from the face and chest, is typically used as the working distance for these reports. However, "Table 3 – Classes of equipment and typical working distances" in IEEE 1584 lists alternate distances that can be used for specific equipment types and voltages. Switchgear, for example, allows for an increased working distance due to equipment design.

As the working distance decreases, the arc-flash incident energy drastically increases. If conditions exist that reduce this distance, the increased flash hazard should be taken into consideration. The calculated incident energy is inversely proportional to the working distance.

This report includes all of the equipment as shown on the one line diagram. For each piece of equipment, the report provides the following information:

1. The faulted bus name.
2. The upstream protective device.
3. The nominal system voltage.
4. The estimated arc-flash boundary distance.
5. The working distance where the incident energy is calculated.
6. The required PPE clothing.

The PPE levels are identified in NFPA 70E-2009 Table 130.7(C)(11). PPE level #0 has an arc rating from 0-1.2cal/cm^2, level #1 has a minimum arc rating of 4cal/cm^2, level #2: 8cal/cm^2, level #3: 25cal/cm^2, and level #4: 40cal/cm^2. 'Extreme Danger' is any arc-flash energy above 40cal/cm^2. At this level and above, there is an additional risk of arc blast. Although protective clothing protects a worker from the flash, the blast at this level can also cause injuries. Injuries sustained can include concussion due to shock wave and physically being thrown away from the blast. The energy from these blasts cannot be evaluated at the present time.

It is also important to properly maintain PPE in accordance with the manufacturers' instructions. The maintenance of insulated rubber gloves is of special concern. The gloves need to be inspected prior to each use. This inspection should involve inflating the glove to verify that there are no leaks. Also, the gloves need to be sent to a laboratory for certification every six months or be replaced as required by PPE supplier.

There is the perception held by some that wearing more than the required level of PPE can be a viably safer solution. Many times this is not the case. Overdressing for the hazard can be a hazard in itself by increasing the likelihood of initiating an arcing fault. Heat, limited visibility, and limited mobility are just a few factors that can increase the likelihood of a fault. However, if the person is wearing the appropriate PPE, the likelihood of receiving life threatening injuries will be drastically reduced.

SAFE WORKING METHODS AND RECOMMENDATIONS

THE SAFEST AND MOST HIGHLY RECOMMENDED METHOD TO WORK ON ELECTRICAL EQUIPMENT IS TO DEENERGIZE ALL OF THE SOURCES OF POWER TO THE EQUIPMENT. With no electricity to the equipment, it is impossible to cause an arc-flash. In addition, work may be accomplished in a shorter time period allowing the equipment to be returned to productive service sooner.

OSHA 29 CFR Subpart S.1910.333 states:

> energized electrical conductors or circuit parts to which an employee may be exposed shall be deenergized before the employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design of operational limitations.

NFPA 70E-2009 Article 130.1(A) states:

> (A) Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works within the Limited Approach Boundary of those conductors or parts.
>
> (1) **Greater Hazard** - Energized work shall be permitted where the employer can demonstrate that deenergizing introduces additional or increased hazards.
>
> (2) **Infeasibility** - Energized work shall be permitted where the employer can demonstrate that the task to be performed is infeasible in a deenergized state due to equipment design or operational limitations.

In some cases, it may be determined that shutting off equipment may actually cause a higher level of safety concern. An example of this would be shutting of the power to the cooling equipment for a reactor; another would be life safety equipment. In these cases, additional electrical safety measures must be employed to work on the equipment while energized. Refer to NFPA 70E-2009 Article 130.1(A) for fine print notes regarding greater hazards and infeasibility.

Included with this report are a number of documents that provide information about the recommended PPE levels and safety practices for the facility. The tabulation of the arc-flash hazards provides a summary of the recommendations for each of the buses in the fault study. The Energized Electrical Work Permit (EEWP) section of the final CD provides an EEWP for each piece of equipment in the study. For equipment with reduced arc-flash values, maintenance procedures have been attached.

EEWP's have been generated for bus locations where the arc energies are above a PPE level #4. These EEWP's will advise that energized work is prohibited. In general, these locations are the transformer secondary through to the main bus beyond the secondary breaker. If a fault were to occur on the main bus that could extend to the transformer side, it could expose the worker to an extremely high energy fault or shock wave.

Also note that many of the arcing faults were limited to a 2 second duration. This 2 second cut-off hopefully allows the worker to move away from the arc or for the supporting personnel to quickly react to shut off power or remove the worker away from the fault. This practice is in accordance with the IEEE 1584-2002.

It is important to stress that these **Energized Electrical Work Permits** are from the data generated as part of the study. The Arc-flash Boundary One Lines and Reports **must** be referenced prior to starting any work in order to ensure the PPE is appropriate for the existing operating conditions. These work permits are based on the calculated working distance as shown. If conditions exist that reduce this distance, it is recommended that equipment be deenergized or further hazard risk assessment be looked into.

These work permits should be used in conjunction with the appropriate equipment one line, and wiring diagrams such as switchgear and MCC one lines and panelboard schedules. The One Line provided with this report is not a complete diagram of the system.

Electrical systems below 240 volts, fed from a transformer smaller than 125kVA, typically do not have the energy levels to produce an arc-flash. While working on these systems, insulated gloves and other normally recommended safety equipment is required.

LABELING

2008 National Electrical Code (NEC) section 110.16 Flash Protection states:

> Switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc-flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

NFPA 70E-2009 -130.3(C) strengthens this NEC section by adding required information about the available incident energy level, or level of (PPE) required to be used while working on this equipment.

The major risk location for arc-flash injuries in a plant is at the 480V levels. Although the 15kV system has higher energy levels, these systems are protected with fuses that are sized for the loads directly served. This closer fuse to loading ratio helps to reduce the incident energies in the case of an arc fault. Energized Electrical Work Permits for work on the secondary terminal side of the substation transformers are excluded from this study. Arc-flash energies at this location are extremely high because the only protection is from the high side transformer fuse. Because of the inability to protect workers in the case of an arc-flash, this portion of the electrical system has been excluded from the reports.

Once again, these labels reflect the required PPE appropriate for a particular piece of equipment but the information from the Energized Electrical Work Permit should also be consulted.

Generally, additional 'generic' shock hazard warning labels need to be placed on equipment that exposes workers to shock hazards. These labels are to be applied to those pieces of equipment like control panels, that are fed from the panelboards. These control panels are typically energized while maintenance, testing and adjustments are being made. Although the arc-flash hazard for these panels can be lower, these panels always expose the worker to electrical shocks and the associated injuries. These labels should be applied as differing pieces of equipment are identified as falling under this category. It is important to note that there are

many pieces of equipment that should be labeled with Shock Hazard labels that are not included on the arc-flash one line diagram.

ABOUT THE LABELS PROVIDED FOR YOUR FACILITY

Labels have been generated for all equipment that is permitted to be worked on while energized. The labels provided are similar to the example shown in Figure 1.

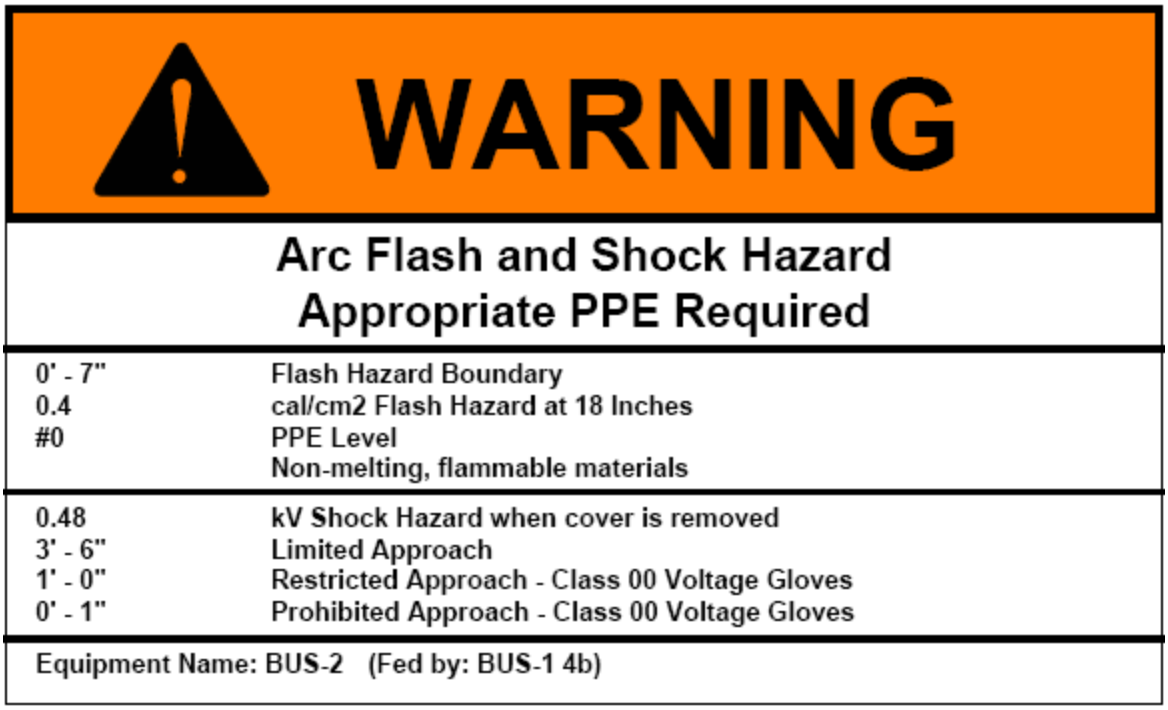


Figure 1 - Typical Arc-flash Label

The label provides information on the arc-flash hazards and the electric shock hazards associated with each piece of equipment. The upper portion of the label describes the arc-flash hazards, while the lower portion describes the electric shock hazards.

Arc Hazard Portion

Arc-flash Protection Boundary: When an arc-flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second

degree burn if an electrical arc-flash were to occur. For equipment classified as 'Extreme Danger' cases, all energized work is prohibited, and therefore energized electrical conductors or circuit parts will never be exposed. For this reason, equipment labeled 'Extreme Danger' does not list a boundary distance. In other cases, a flash hazard boundary has been determined for each piece of equipment and is printed on the label. In addition to ensuring that the qualified worker wears the appropriate PPE as indicated by the label, the area within the flash hazard boundary must be kept clear of all individuals who are not qualified, and all qualified individuals not wearing the appropriate PPE while energized work is performed.

Cal/cm^2 Flash Hazard at 18 inches: This value indicates the flash hazard incident energy that a worker could be exposed to in the event of an arc-flash incident. This calculation is performed at 18", meaning that it is assumed that the workers face and body will be at least this distance from the exposed arcing parts when a fault occurs. This is based on a workers arm being extended approximately 12" from his or her body, and the potential arc occurring 6" into the equipment, measured from the front. 18 inches is essentially an industry standard for this calculation. (Reference ASTM F 18). However, "Table 3 – Classes of equipment and typical working distances" in IEEE 1584 lists alternate distances that can be used for specific equipment types and voltages. Switchgear, for example, allows for an increased working distance due to equipment design.

Fed by: The designation "Fed by" indicates the nearest upstream over-current protective device. It may not necessarily be the first device to trip in the event of a short circuit. It also may not be the nearest upstream disconnecting device, as there may be a switch or local disconnect between the "Fed by" element and the bus or device specified on the label.

Shock Hazard Portion

kV Shock Hazard when cover is removed: This indicates the voltage hazard that is present at the particular piece of equipment when the energized electrical conductors or circuit parts are exposed.

Limited Approach: The limited approach boundary defines a distance clear from energized electrical conductors or circuit parts that must be maintained by unqualified individuals. Where unqualified individuals are working adjacent to or near the limited approach boundary, the designated qualified individual in charge of the work space where the electrical hazard exists shall coordinate with the designated individual in charge of the unqualified workers to ensure that their work can be performed safely. This shall include advising the unqualified individuals of the electrical hazard and ensuring that such individuals stay outside of both the arc-flash hazard boundary and the limited approach boundary.

Restricted Approach: The restricted approach boundary refers to a portion of the area immediately adjacent to the exposed energized electrical conductors or circuit parts. Access to this area is restricted to qualified individuals wearing the PPE appropriate to the shock and arc-flash hazard, who have an approved plan, and are authorized to do the work within this boundary. They may cross the restricted boundary only to the extent that is necessary to perform their work. The value indicated on the label indicates the distance that the restricted approach boundary extends from the energized electrical conductors or circuit parts. The type of gloves required to properly insulate the worker against the shock hazard are also indicated on the label.

Prohibited Approach: All of the requirements for the restricted approach boundary apply. The prohibited approach boundary refers to the portion of the area immediately adjacent to the energized electrical conductors or circuit parts where presence in this area is considered the same as making physical contact with the energized electrical conductor or circuit part. The value indicated on the label indicates the distance that the prohibited approach boundary extends from the energized electrical conductors or circuit parts. The type of gloves required to properly insulate the worker against the shock hazard are also indicated on the label. No un-insulated portion of the workers body is permitted within this boundary.

ELECTRICAL SAFETY POLICY and the LOCKOUT/TAGOUT PROCEDURE

The Electrical Safety Policy and the Lockout/Tagout Safety Procedure are two essential documents that must be reviewed in conjunction with the results of this study. Portions of each document control the activities described in the Energized Electrical Work Permit. In addition, each piece of equipment should have an established Electrical Safety Specific Procedure that controls the methods of testing, troubleshooting, repair and maintenance. These policies and procedures as well as the Job Briefing and Planning Checklist are required tools in order to have an electrically safe work situation.

SUMMARY

Again, **the SAFEST way to work on electrical equipment is de-energize and lockout the equipment**. The results of this study also rely on accurate data regarding wire, conduit, breaker, fuse, and gear information. If discrepancies are found, expansions occur, or large loads are added, the study should be updated to confirm arc-energies and required PPE levels used. If there are any questions about the findings in this report, or if any clarifications are needed, please contact EDG. NFPA 70E-2009 requires that the analysis be updated when any major modification or renovation takes place, or a minimum of five years. Updating the arc-flash study periodically will confirm the values in this report and identify any changes in PPE required. Appendix G contains the "Simple Report", a brief summary of the results of the arc-flash analysis.

At this time our recommendations are:

- The duty violations, as outlined in Appendix F, present a hazard in that they may not operate properly in the event of a short circuit. The most straightforward option to remedy the situation is to replace the existing circuit breakers with breakers having a higher interrupting rating. This will ensure that, in the event of a short circuit, the breakers will operate properly. Another possibility is that increased cable length will reduce the available energy enough that duty violations will disappear.
- Installation of mechanical interlocks and/or Kirk Key systems to eliminate dangerous conditions. Review of EDG, Inc. drawing EP-01 concludes that the following perilous scenarios exist:
    - Protective device in MS-1, 3C closed. Protective device in MCC-A1, 1A opened. (Devices Kirk Key interlocked). Loss of utility power. Gen Set starts. ATS-A2 transfers to emergency source. Utility 1 is back feed through Utility transformer UTX1. The back feed occurs from the Gen Set through ATS-A2 through MCC-A2 through MCC-D1 through MCC-D2 through MCC-A1 through MS1 to UTX1.
    - Protective device in MS-1, 3C closed. Protective device in MCC-A1, 1A opened. (Devices Kirk Key interlocked). Loss of utility power. Gen Set starts. ATS-A2 transfers to emergency source. Utility 1 is back feed through Utility transformer UTX1. The back feed occurs from the Gen Set through ATS-A2 through MCC-A2 through MCC-E2 through MCC-E1 through MCC-A1 through MS-1 to UTX1.

- Gen Set running. ATS-A2 connected to emergency source. Protective device in MS-1, 3C opened. Protective device in MCC-A1, 1A closed. (Devices Kirk Key interlocked). The system now has a loop feed. The loop path is Gen Set through MCC-A1 through MCC-D2 through MCC-D1 through MCC-A2 through ATS-A2 back to the Gen Set.
- Gen Set running. ATS-A2 connected to emergency source. Protective device in MS-1, 3C opened. Protective device in MCC-A1, 1A closed. (Devices Kirk Key interlocked). The system now has a loop feed. The loop path is Gen Set through MCC-A1 through MCC-E2 through MCC-E1 through MCC-A2 through ATS-A2 back to the Gen Set.

GLOSSARY

arcing fault current:

A fault current flowing through an electrical arc plasma, also called arc fault current and arc current.

arc-flash protection boundary:

When an arc-flash hazard exists, arc-flash protection boundary is an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc-flash were to occur.

available fault current:

The electrical current that can be provided by the serving utility and facility-owned electrical generating devices and large electric motors, considering the amount of impedance in the current path.

bolted fault current:

A short circuit or electrical contact between two conductors at different potentials in which the impedance or resistance between the conductors is essentially zero.

circuit:

A conductor or system of conductors through which an electric current is intended to flow.

energized electrical work permit (EEWP):

A written permit to be filled out if work is to be performed while energized electrical conductors or circuit parts are not placed in an electrically safe work condition.

electrical hazard:

A dangerous condition in which inadvertent or unintentional contact or equipment failure can result in shock, arc-flash burn, thermal burn or blast.

electrical shock:

Physical stimulation that occurs when electrical current passes through the body.

electrical utilization equipment:

Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.

energized:

Electrically connected to or having a source of voltage.

exposed (energized electrical conductors or circuit parts**):**

Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated.

fault current:

A current that flows from one conductor to ground or to another conductor due to an abnormal connection (including an arc) between the two.

flash hazard analysis:

A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc-flash protection boundary, and the appropriate levels of PPE.

institute of electrical and electronics engineers (IEEE):

Professional organization for the advancement of technology related to electricity.

incident energy:

The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. Incident energy is measured in either joules per square centimeter (J/cm^2) or calories per square centimeter (Cal/cm^2).

occupational safety and health administration (OSHA):

An agency of the United States Department of Labor who's mission is to prevent work related injuries.

national fire protection agency (NFPA):

An organization charged with creating and maintaining minimum standards and requirements for fire prevention.

personal protective equipment (PPE):

Protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be performed.

qualified person:

One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

shock hazard:

A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.

unqualified person:

A person who is not a qualified person.

voltage (nominal):

A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (as 120/240 V, 480Y/277 V, 600 V). The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

working distance:

The dimension between the possible arc point and the head and body of the worker positioned in place to perform the assigned task.

working on:

Coming in contact with energized electrical conductors or circuit parts with hands, feet, other body parts, tools, probes, or test equipment, regardless of the personal protective equipment a person is wearing. There are two categories of “working on”: Diagnostic (testing) is taking readings or measurements of electrical equipment with approved test equipment that does not require making any physical change to the equipment; repair is any physical alteration of electrical equipment (such as making or tightening connections, removing or replacing components, etc.)

APPENDIX A

OECC MS1

Summary

1	Base MVA	10
2	Frequency	60
3	Buses	89
4	MCC Schedules	0
5	Panel Schedules	0
6	Utilities	1
7	Generators	1
8	UPS	0
9	Motors	52
10	Capacitors	0
11	Loads	0
12	Shunts	0
13	Filters	0
14	2-Transformers	0
15	3-Transformers	0
16	Zigzags	0
17	Cables	87
18	Busways	1
19	Xmission Lines	0
20	CL Reactors	0
21	HV Breakers	0
22	LV Breakers	50
23	Switches	28
24	Fuses	28
25	ATS	2
26	Meters	0
27	CTs	0
28	Relays	0
29	Notes	12
30	Lines	0
31	Total Buses/Nodes	91

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
1	AER 1 MIXERS	0.48			Other
2	AER 2 MIXERS	0.48			Other
3	AER 3 MIXERS	0.48			Other
4	AER 4 MIXERS	0.48			Other
5	AER 5 MIXERS	0.48			Other
6	AER 6 MIXERS	0.48			Other
7	AERTANK1 MIXER1	0.48			Other
8	AERTANK1 MIXER2	0.48			Other
9	AERTANK2 MIXER1	0.48			Other
10	AERTANK2 MIXER2	0.48			Other
11	AERTANK2 MIXER3	0.48			Other
12	AERTANK3 MIXER1	0.48			Other
13	AERTANK3 MIXER2	0.48			Other
14	AERTANK3 MIXER3	0.48			Other
15	AERTANK4 MIXER1	0.48			Other
16	AERTANK4 MIXER2	0.48			Other
17	AERTANK4 MIXER3	0.48			Other
18	AERTANK5 MIXER1	0.48			Other
19	AERTANK5 MIXER2	0.48			Other
20	AERTANK5 MIXER3	0.48			Other
21	AERTANK6 MIXER1	0.48			Other
22	AERTANK6 MIXER2	0.48			Other
23	BLOWER	0.48			Other
24	BLOWER #3	0.48			Other
25	BLOWER NO. 1	0.48			Other
26	BLOWER NO. 2	0.48			Other
27	CL 2 PUMP	0.48			Other
28	CLARIFIER #1 DS	0.48			Other
29	CLARIFIER #2 DS	0.48			Other
30	CLARIFIER #3 DS	0.48			Other
31	CLARIFIER #4 DS	0.48			Other
32	CONC SLG PMP1 DS	0.48			Other
33	CONC SLG PMP2 DS	0.48			Other
34	DS1	0.48			Other
35	DS2	0.48			Other
36	DS2-1C (MAIN)	0.48			Other
37	ELEC HOIST	0.48			Other
38	EXHAUST FAN DS	0.48			Other
39	FOAM SPRY PMP DS	0.48			Other
40	FUEL TFER PUMP 1	0.48			Other
41	FUEL TFER PUMP 2	0.48			Other
42	GEN1	0.48			Other
43	GEN1 RAD FAN DS	0.48			Other
44	GRINDER 1	0.48			Other
45	GRINDER 2	0.48			Other
46	INFLUE PMP1 DS	0.48			Other
47	INFLUE PMP1 VFD	0.48			Other
48	INFLUE PMP2 DS	0.48			Other
49	INFLUE PMP2 VFD	0.48			Other
50	INFLUE PMP3 DS	0.48			Other
51	INFLUE PMP3 VFD	0.48			Other
52	INFLUE PMP4 DS	0.48			Other
53	INFLUE PMP4 VFD	0.48			Other
54	INFLUE PMP5 DS	0.48			Other
55	INFLUE PMP5 VFD	0.48			Other
56	INFLUE PMP6 DS	0.48			Other
57	INFLUE PMP6 VFD	0.48			Other
58	INFLUE PMP7 DS	0.48			Other
59	INFLUE PMP7 VFD	0.48			Other
60	LTG CONTACTOR 2	0.48			Other
61	MCCA1	0.48			Copper

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
62	MCCA2	0.48			Copper
63	MCCA3	0.48			Other
64	MCCB	0.48			Other
65	MCCB-1A	0.48			Other
66	MCCC	0.48			Copper
67	MCCC MAIN	0.48			Other
68	MCCD1	0.48			Other
69	MCCD1-1A	0.48			Other
70	MCCD2	0.48			Copper
71	MCCD2-3A	0.48			Other
72	MCCE1	0.48			Other
73	MCCE2	0.48			Other
74	MS1	0.48	2500		Copper
75	MS1-1A (MAIN)	0.48			Other
76	NPOT H20 PMP1 DS	0.48			Other
77	NPOT H2O SUP2 DS	0.48			Other
78	POST AIR #1 DS	0.48			Other
79	POST AIR #2 DS	0.48			Other
80	RAS #1 DS	0.48			Other
81	RAS #2 DS	0.48			Other
82	RAS #3 DS	0.48			Other
83	RAS #4 DS	0.48			Other
84	RAS #5 DS	0.48			Other
85	RAS #6 DS	0.48			Other
86	T4	0.48			Other
87	UTX-1 SEC	0.48			Other
88	VEHICLE STG BLDG	0.48			Other
89	WELL HEATERS	0.48			Other

Utilities

	ID Name	To bus	Base kV	Util kV	Fault Unit	3Ph SC1	3Ph SC2	SLG SC1	SLG SC2
1	104-911-972-3	UTX-1 SEC	0.48	0.48	kA	1.551	2.46	1.04	2.37

Generators

	ID Name	Status	To bus	Base kV	Gen kV	Conn	MVA	Type	Power Factor	Efficiency	RPM	X/R	X"dv	X'dv	X0
1	GEN-1	Off	GEN1	0.48	0.48	YG	0.781	SYN-S	0.8	0.95	1800	22.909	15	20	2

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
1	245	MCCA2	0.48	CLARIFIER #2 DS	0.48	U.S.	1/C	1	10	245	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
2	C-2	UTX-1 SEC	0.48	MS1-1A (MAIN)	0.48	U.S.	1/C	3	1000	77	THWN	1635	1635	Copper	Conduit	0.0163	0.0365	0.0652	0.1458	0.0032	0.0032
3	C-3_C	MS1	0.48	ATS-A1:Src Bus 1	0.48	U.S.	1/C	2	600	50	THWN	840	840	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
4	C-4_A	GEN1	0.48	DS2-1C (MAIN)	0.48	U.S.	1/C	3	600	40	THWN	1260	1260	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
5	C-5	DS2	0.48	ATS-A1:Src Bus 2	0.48	U.S.	1/C	2	600	50	THWN	840	840	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
6	C-7_C	MCCA1	0.48	MCCD2-3A	0.48	U.S.	1/C	1	500	385	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
7	C-8	DS2	0.48	ATS-A2:Src Bus 1	0.48	U.S.	1/C	2	350	50	THWN	620	620	Copper	Conduit	0.0357	0.0381	0.1426	0.1524	0.0045	0.0045
8	C-9	MS1	0.48	ATS-A2:Src Bus 2	0.48	U.S.	1/C	2	600	50	THWN	840	840	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
9	C-10	MCCA1	0.48	DS2	0.48	U.S.	1/C	2	350	40	THWN	620	620	Copper	Conduit	0.0357	0.0381	0.1426	0.1524	0.0045	0.0045
10	C-11	MCCA1	0.48	RAS #1 DS	0.48	U.S.	1/C	1	10	50	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
11	C-11_A	MCCA1	0.48	RAS #2 DS	0.48	U.S.	1/C	1	10	55	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
12	C-11_B	MCCA1	0.48	CLARIFIER #1 DS	0.48	U.S.	1/C	1	10	245	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
13	C-11_C	MCCA1	0.48	RAS #4 DS	0.48	U.S.	1/C	1	10	55	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
14	C-11_D	MCCA1	0.48	CLARIFIER #4 DS	0.48	U.S.	1/C	1	10	245	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
15	C-11_E	MCCA1	0.48	BLOWER #3	0.48	U.S.	1/C	1	4/0	55	THWN	230	230	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
16	C-11_F	MCCA2	0.48	BLOWER NO. 1	0.48	U.S.	1/C	1	4/0	35	THWN	230	230	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
17	C-11_G	MCCA2	0.48	BLOWER NO. 2	0.48	U.S.	1/C	1	4/0	45	THWN	230	230	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
18	C-11_H	MCCA2	0.48	RAS #3 DS	0.48	U.S.	1/C	1	10	60	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
19	C-11_I	MCCA2	0.48	RAS #5 DS	0.48	U.S.	1/C	1	10	55	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
20	C-11_J	MCCA2	0.48	RAS #6 DS	0.48	U.S.	1/C	1	10	60	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
21	C-11_L	MCCA2	0.48	CLARIFIER #3 DS	0.48	U.S.	1/C	1	10	245	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
22	C-11_M	MCCA1	0.48	MCCE1	0.48	U.S.	1/C	1	2	100	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
23	C-11_N	MCCA1	0.48	MCCC MAIN	0.48	U.S.	1/C	1	250	180	THWN	255	255	Copper	Conduit	0.0486	0.039	0.1944	0.1561	0.0052	0.0052
24	C-12	MS1	0.48	MCCA1	0.48	U.S.	1/C	2	500	40	THWN	760	760	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
25	C-13	ATS-A2:Load Bus	0.48	MCCA2	0.48	U.S.	1/C	2	600	50	THWN	840	840	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
26	C-14	MCCB	0.48	ELEC HOIST	0.48	U.S.	1/C	1	10	29	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
27	C-14_A	MCCB	0.48	WELL HEATERS	0.48	U.S.	1/C	1	10	60	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
28	C-16	MCCA2	0.48	MCCA3	0.48	U.S.	1/C	1	600	40	THWN	420	420	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
29	C-16_A	MCCA2	0.48	MCCE2	0.48	U.S.	1/C	1	2	180	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
30	C-16_B	MCCA1	0.48	LTG CONTACTOR 2	0.48	U.S.	1/C	1	10	12	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
31	C-16_E	MCCA2	0.48	T4	0.48	U.S.	1/C	1	10	206	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
32	C-18	MCCC	0.48	CONC SLG PMP1 DS	0.48	U.S.	1/C	1	10	130	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
33	C-18_A	MCCC	0.48	CONC SLG PMP2 DS	0.48	U.S.	1/C	1	10	150	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
34	C-18_B	MCCC	0.48	BLOWER	0.48	U.S.	1/C	1	8	157	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
35	C-19_I	MCCD1	0.48	FOAM SPRY PMP DS	0.48	U.S.	1/C	1	6	111	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
36	C-19_J	MCCD1	0.48	POST AIR #1 DS	0.48	U.S.	1/C	1	4	55	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
37	C-19_N	MCCD1	0.48	NPOT H20 PMP1 DS	0.48	U.S.	1/C	1	6	45	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
38	C-19_O	MCCD1	0.48	POST AIR #2 DS	0.48	U.S.	1/C	1	4	65	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
39	C-23	ATS-A1:Load Bus	0.48	DS1	0.48	U.S.	1/C	2	600	245	THWN	840	840	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
40	C-24	DS1	0.48	INFLUE PMP1 VFD	0.48	U.S.	1/C	1	1	20	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
41	C-24_A	DS1	0.48	EXHAUST FAN DS	0.48	U.S.	1/C	1	1/0	100	THWN	150	150	Copper	Conduit	0.112	0.0407	0.448	0.1627	0.0065	0.0065
42	C-24_B	INFLUE PMP1 VFD	0.48	INFLUE PMP1 DS	0.48	U.S.	1/C	1	1	135	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
43	C-25	DS1	0.48	INFLUE PMP2 VFD	0.48	U.S.	1/C	1	1	20	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
44	C-25_A	INFLUE PMP2 VFD	0.48	INFLUE PMP2 DS	0.48	U.S.	1/C	1	1	130	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
45	C-26	DS1	0.48	INFLUE PMP3 VFD	0.48	U.S.	1/C	1	1/0	20	THWN	150	150	Copper	Conduit	0.112	0.0407	0.448	0.1627	0.0065	0.0065
46	C-26_A	DS1	0.48	INFLUE PMP4 VFD	0.48	U.S.	1/C	1	1/0	20	THWN	150	150	Copper	Conduit	0.112	0.0407	0.448	0.1627	0.0065	0.0065
47	C-26_B	DS1	0.48	INFLUE PMP5 VFD	0.48	U.S.	1/C	1	1/0	20	THWN	150	150	Copper	Conduit	0.112	0.0407	0.448	0.1627	0.0065	0.0065
48	C-26_C	DS1	0.48	INFLUE PMP6 VFD	0.48	U.S.	1/C	1	2	20	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
49	C-26_D	DS1	0.48	INFLUE PMP7 VFD	0.48	U.S.	1/C	1	2	20	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
50	C-26_E	DS1	0.48	GRINDER 1	0.48	U.S.	1/C	1	12	30	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
51	C-26_F	DS1	0.48	GRINDER 2	0.48	U.S.	1/C	1	12	30	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
52	C-26_G	INFLUE PMP3 VFD	0.48	INFLUE PMP3 DS	0.48	U.S.	1/C	1	1	125	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
53	C-26_H	INFLUE PMP4 VFD	0.48	INFLUE PMP4 DS	0.48	U.S.	1/C	1	1	120	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
54	C-26_I	INFLUE PMP5 VFD	0.48	INFLUE PMP5 DS	0.48	U.S.	1/C	1	1	115	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
55	C-26_J	INFLUE PMP6 VFD	0.48	INFLUE PMP6 DS	0.48	U.S.	1/C	1	2	110	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
56	C-26_K	INFLUE PMP7 VFD	0.48	INFLUE PMP7 DS	0.48	U.S.	1/C	1	2	70	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
57	C-27	MCCD2	0.48	NPOT H2O SUP2 DS	0.48	U.S.	1/C	1	8	60	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
58	C-27_A	MCCD2	0.48	VEHICLE STG BLDG	0.48	U.S.	1/C	1	1/0	26	THWN	150	150	Copper	Conduit	0.112	0.0407	0.448	0.1627	0.0065	0.0065
59	C-28	MCCD2	0.48	CL 2 PUMP	0.48	U.S.	1/C	1	3/0	100	THWN	200	200	Copper	Conduit	0.0705	0.0391	0.2818	0.1566	0.0053	0.0053
60	C-30_A	MCCA3	0.48	FUEL TFER PUMP 1	0.48	U.S.	1/C	1	10	54	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
61	C-30_AF	MCCA3	0.48	AER 1 MIXERS	0.48	U.S.	1/C	1	8	105	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
62	C-30_AG	MCCA3	0.48	AER 2 MIXERS	0.48	U.S.	1/C	1	8	80	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
63	C-30_AH	MCCA3	0.48	AER 3 MIXERS	0.48	U.S.	1/C	1	8	55	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
64	C-30_AI	MCCA3	0.48	AER 4 MIXERS	0.48	U.S.	1/C	1	8	55	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
65	C-30_AJ	MCCA3	0.48	AER 5 MIXERS	0.48	U.S.	1/C	1	8	85	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
66	C-30_AK	MCCA3	0.48	AER 6 MIXERS	0.48	U.S.	1/C	1	8	105	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
67	C-30_AN	MCCA3	0.48	GEN1 RAD FAN DS	0.48	U.S.	1/C	1	10	53	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
68	C-30_B	MCCA3	0.48	FUEL TFER PUMP 2	0.48	U.S.	1/C	1	10	64	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
69	C-30_C	AER 2 MIXERS	0.48	AERTANK2 MIXER2	0.48	U.S.	1/C	1	10	29	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
70	C-30_D	AER 3 MIXERS	0.48	AERTANK3 MIXER2	0.48	U.S.	1/C	1	10	29	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
71	C-30_E	AER 4 MIXERS	0.48	AERTANK4 MIXER2	0.48	U.S.	1/C	1	10	29	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
72	C-30_F	AER 5 MIXERS	0.48	AERTANK5 MIXER2	0.48	U.S.	1/C	1	10	45	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
73	C-30_G	AER 6 MIXERS	0.48	AERTANK6 MIXER1	0.48	U.S.	1/C	1	10	25	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
74	C-33	MCCD1	0.48	MCCD2	0.48	U.S.	1/C	1	250	30	THWN	255	255	Copper	Conduit	0.0486	0.039	0.1944	0.1561	0.0052	0.0052
75	C-35	DS1	0.48	MCCB-1A	0.48	U.S.	1/C	1	6	20	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
76	C-49	MCCA2	0.48	MCCD1-1A	0.48	U.S.	1/C	1	500	300	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
77	C-54	AER 1 MIXERS	0.48	AERTANK1 MIXER1	0.48	U.S.	1/C	1	10	25	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
78	C-54_A	AER 1 MIXERS	0.48	AERTANK1 MIXER2	0.48	U.S.	1/C	1	10	45	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
79	C-54_B	AER 2 MIXERS	0.48	AERTANK2 MIXER1	0.48	U.S.	1/C	1	10	25	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
80	C-54_C	AER 2 MIXERS	0.48	AERTANK2 MIXER3	0.48	U.S.	1/C	1	10	50	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
81	C-54_E	AER 3 MIXERS	0.48	AERTANK3 MIXER1	0.48	U.S.	1/C	1	10	25	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
82	C-54_F	AER 3 MIXERS	0.48	AERTANK3 MIXER3	0.48	U.S.	1/C	1	10	55	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
83	C-54_G	AER 4 MIXERS	0.48	AERTANK4 MIXER1	0.48	U.S.	1/C	1	10	25	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
84	C-54_H	AER 4 MIXERS	0.48	AERTANK4 MIXER3	0.48	U.S.	1/C	1	10	65	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
85	C-54_I	AER 5 MIXERS	0.48	AERTANK5 MIXER1	0.48	U.S.	1/C	1	10	25	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
86	C-54_J	AER 5 MIXERS	0.48	AERTANK5 MIXER3	0.48	U.S.	1/C	1	10	65	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
87	C-54_L	AER 6 MIXERS	0.48	AERTANK6 MIXER2	0.48	U.S.	1/C	1	10	45	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081

Busways

	ID Name	Status	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Manufacturer	Length	Type	Ampacity	Material	R1	X1	R0	X0	R1 pu	X1 pu	R0 pu	X0 pu	Hrm RC Factor	Hrm RC Value	I Hrm Rating
1	BUSS-1	On	MCCE1	0.48	MCCE2	0.48	U.S.	(Generic)	10	(Std)	225	Copper	0.0036	0.0026	0.0614	0.0439	0.0157	0.0112	0.2664	0.1904	R-EXP	0.5	225

Busways

	ID Name	Comment
1	BUSS-1	

LV Breakers

	ID Name	On Bus	Base kV	Class	Breaker Mfr	Breaker Style	Cont Current (A)	SC Int kA	Trip	Trip Mfr	Trip Type	Trip Style	Sensor/Frame	Plug/Tap/Trip	LTPU Setting	LTPU Mult	Trip (A)
1	DS1-1B1	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (125AT)	125			125
2	DS1-1D2	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (100AT)	100			100
3	DS1-1E1	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (20AT)	20			20
4	DS1-1E2	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (20AT)	20			20
5	DS1-1F1	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (100AT)	100			100
6	DS1-1G1	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (125AT)	125			125
7	DS1-1G2	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (100AT)	100			100
8	DS1-1H1	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (125AT)	125			125
9	DS1-1H2	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (125AT)	125			125
10	DS1-1I1	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (125AT)	125			125
11	DS1-1I2	DS1	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (125AT)	125			125
12	DS1-1K MAIN	DS1	0.48	MCCB	Cutler Hammer	ND	1200	50	SST	Cutler-Hammer	DT RMS 310	N-Frame	800	800	1		800
13	DS2-1C (MAIN)	DS2	0.48	MCCB	Cutler Hammer	ND	1200	50	SST	Cutler-Hammer	DT RMS 310	N-Frame	1200	1200	1		1200
14	DS2-1D ATS-A2	DS2	0.48	MCCB	Cutler Hammer	MD	800	35	SST	Cutler-Hammer	DT RMS 310	N-Frame	800	600	1		600
15	DS2-1E ATS-A1	DS2	0.48	MCCB	Cutler Hammer	MD	800	35	SST	Cutler-Hammer	DT RMS 310	N-Frame	800	800	1		800
16	DS2-1F MCC A1	DS2	0.48	MCCB	Cutler Hammer	MD	800	35	SST	Cutler-Hammer	DT RMS 310	N-Frame	800	600	1		600
17	MCCA1-5A	MCCA1	0.48	MCCB	(Generic)	400 AF	400	35	TMGN	(Generic)	Std	400 AF	400A (300AT)	300			300
18	MCCA2-3A	MCCA2	0.48	MCCB	(Generic)	400 AF	400	35	TMGN	(Generic)	Std	400 AF	400A (300AT)	300			300
19	MCCA2-4A	MCCA2	0.48	MCCB	(Generic)	400 AF	400	35	TMGN	(Generic)	Std	400 AF	400A (300AT)	300			300
20	MCCA3-1D1	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (40AT)	40			40
21	MCCA3-1D2	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (40AT)	40			40
22	MCCA3-1E1	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (40AT)	40			40
23	MCCA3-1E2	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (40AT)	40			40
24	MCCA3-1F1	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (40AT)	40			40
25	MCCA3-1F2	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (40AT)	40			40
26	MCCA3-2A	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (15AT)	15			15
27	MCCA3-2B	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (15AT)	15			15
28	MCCA3-2D	MCCA3	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (30AT)	30			30
29	MCCB-1A	MCCB	0.48	MCCB	Siemens	HED4	125	42	TMGN	Siemens	(Std)	HED4	125A(30-125AT)	100			100
30	MCCB-1C	MCCB	0.48	MCCB	ITE	HE	100	25	TMGN	ITE	ETH	HE	100A (15AT)	15			15
31	MCCB-1E	MCCB	0.48	MCCB	ITE	HE	100	25	TMGN	ITE	ETH	HE	100A (15AT)	15			15
32	MCCC MAIN	MCCC	0.48	MCCB	Siemens	ED4	125	18	TMGN	Siemens	(Std)	ED4	100A (100AT)	100			100
33	MCCC-1C	MCCC	0.48	MCCB	ITE	HE4	100	25	TMGN	ITE	ETH	HE4	100A (70AT)	70			70
34	MCCC-1D	MCCC	0.48	MCCB	ITE	HE4	100	25	TMGN	ITE	ETH	HE4	100A (30AT)	30			30
35	MCCC-2D	MCCC	0.48	MCCB	ITE	HE4	100	25	TMGN	ITE	ETH	HE4	100A (30AT)	30			30
36	MCCD1-1A	MCCD1	0.48	MCCB	ITE	JL	400	30	TMGN	ITE	ET	JL	400A(250-300AT)	300			300
37	MCCD1-1D	MCCD1	0.48	MCCB	ITE	HE4	100	25	TMGN	ITE	ETH	HE4	100A (40AT)	40			40
38	MCCD1-2B	MCCD1	0.48	MCCB	(Generic)	225 AF	225	25	TMGN	(Generic)	Std	225 AF	225(150-225AT)	225			225
39	MCCD1-3B	MCCD1	0.48	MCCB	ITE	HE4	100	25	TMGN	ITE	ETH	HE4	100A (40AT)	40			40
40	MCCD1-3C	MCCD1	0.48	MCCB	GE	TED	150	25	TMGN	GE	UNIT	TED	150A(60-80AT)	80			80
41	MCCD1-4B	MCCD1	0.48	MCCB	GE	TED	150	25	TMGN	GE	UNIT	TED	150A(60-80AT)	80			80
42	MCCD2-2A2	MCCD2	0.48	MCCB	ITE	HE4	100	25	TMGN	ITE	ETH	HE4	100A (100AT)	100			100
43	MCCD2-2B	MCCD2	0.48	MCCB	GE	TED (480V)	150	18	TMGN	GE	E150	TED (480V)	150A(60-80AT)	70			70
44	MCCD2-2D	MCCD2	0.48	MCCB	(Generic)	400 AF	400	35	TMGN	(Generic)	Std	400 AF	400A (300AT)	300			300
45	MCCD2-3A	MCCD2	0.48	MCCB	(Generic)	400 AF	400	35	TMGN	(Generic)	Std	400 AF	400A (300AT)	300			300
46	MCCE1-1A	MCCE1	0.48	MCCB	(Generic)	150 AF	150	25	TMGN	(Generic)	Std	150 AF	150A	70			70
47	MCCE1-1C2	MCCE1	0.48	MCCB	(Generic)	150 AF	150	25	TMGN	(Generic)	Std	150 AF	150A	50			50
48	MCCE2-1A	MCCE2	0.48	MCCB	(Generic)	150 AF	150	25	TMGN	(Generic)	Std	150 AF	150A	70			70
49	MS1-1A (MAIN)	MS1	0.48	MCCB	Cutler Hammer	PC	3000	100	SST	Cutler-Hammer	Seltronic	PC	2500A (Adj)	2500	1		2500
50	MS1-3C MCCA1	MS1	0.48	MCCB	Cutler Hammer	ND	1200	50	SST	Cutler-Hammer	DT RMS 310	N-Frame	800	800	1		800

LV Breakers

	ID Name	LT Curve	LTD Band	STPU Setting	STPU Band	STPU I2T	STPU (A)	Maint Mode	Inst Setting	Inst (A)
1	DS1-1B1								Fixed	
2	DS1-1D2								Fixed	
3	DS1-1E1								Fixed	
4	DS1-1E2								Fixed	
5	DS1-1F1								Fixed	
6	DS1-1G1								Fixed	
7	DS1-1G2								Fixed	
8	DS1-1H1								Fixed	
9	DS1-1H2								Fixed	
10	DS1-1I1								Fixed	
11	DS1-1I2								Fixed	
12	DS1-1K MAIN		Fixed	2	300ms	Out	1600		Fixed	14000
13	DS2-1C (MAIN)		Fixed	8	300ms	Out	9600		Fixed	14000
14	DS2-1D ATS-A2		Fixed	8	300ms	Out	4800		Fixed	14000
15	DS2-1E ATS-A1		Fixed	8	300ms	Out	6400		Fixed	14000
16	DS2-1F MCC A1		Fixed	8	300ms	Out	4800		Fixed	14000
17	MCCA1-5A								3000	3000
18	MCCA2-3A								3000	3000
19	MCCA2-4A								3000	3000
20	MCCA3-1D1								Fixed	
21	MCCA3-1D2								Fixed	
22	MCCA3-1E1								Fixed	
23	MCCA3-1E2								Fixed	
24	MCCA3-1F1								Fixed	
25	MCCA3-1F2								Fixed	
26	MCCA3-2A								Fixed	
27	MCCA3-2B								Fixed	
28	MCCA3-2D								Fixed	
29	MCCB-1A								Fixed	800
30	MCCB-1C								Fixed	850
31	MCCB-1E								Fixed	850
32	MCCC MAIN								10	1000
33	MCCC-1C								900	900
34	MCCC-1D								900	900
35	MCCC-2D								900	900
36	MCCD1-1A								2250	2250
37	MCCD1-1D								900	900
38	MCCD1-2B								Hi	2250
39	MCCD1-3B								900	900
40	MCCD1-3C								Fixed	
41	MCCD1-4B								Fixed	
42	MCCD2-2A2								900	900
43	MCCD2-2B								Fixed	
44	MCCD2-2D								3000	3000
45	MCCD2-3A								3000	3000
46	MCCE1-1A								Fixed	
47	MCCE1-1C2								Fixed	
48	MCCE2-1A								Fixed	
49	MS1-1A (MAIN)		Fixed	5x	Fixed	Out	12500		Fixed	37000
50	MS1-3C MCCA1		Fixed						Fixed	14000

Switches

	ID Name	Status	On Bus	Base kV	Conn Type	Normal State	Manufacturer	Type	Style	Cont Current (A)	SC Mom kA	SC Test Std	PCC kVA Demand	PCC Isc/ILoad	Comment
1	ATS-A1:Switch 1	On	ATS-A1:Load Bus	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
2	ATS-A2:Switch 2	On	ATS-A2:Load Bus	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
3	RAS #3	On	RAS #3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
4	RAS #5	On	RAS #5 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
5	RAS #6	On	RAS #6 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
6	S-1	On	INFLUE PMP4 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
7	S-2	On	RAS #1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
8	S-21	On	NPOT H2O SUP2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
9	S-2_A	On	RAS #2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
10	S-2_B	On	CLARIFIER #1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
11	S-2_C	On	RAS #4 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
12	S-2_D	On	CLARIFIER #4 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
13	S-2_H	On	CLARIFIER #2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
14	S-2_I	On	CLARIFIER #3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
15	S-3	On	GEN1 RAD FAN DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
16	S-4	On	EXHAUST FAN DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
17	S-5	On	INFLUE PMP6 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
18	S-7	On	INFLUE PMP1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
19	S-8	On	INFLUE PMP7 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
20	S-10	On	INFLUE PMP2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
21	S-12	On	INFLUE PMP3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
22	S-13	On	INFLUE PMP5 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
23	S-14	On	CONC SLG PMP1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
24	S-15	On	CONC SLG PMP2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
25	S-16	On	NPOT H20 PMP1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
26	S-17	On	FOAM SPRY PMP DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
27	S-18	On	POST AIR #1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
28	S-19	On	POST AIR #2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			

Fuses

	ID Name	On Bus	Base kV	Conn Type	Manufacturer	Type	Style	TCC Size	SC Int kA
1	INFLUE PMP1 VFD	INFLUE PMP1 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	150A~	200
2	INFLUE PMP2 VFD	INFLUE PMP2 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	150A~	200
3	INFLUE PMP3 VFD	INFLUE PMP3 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	150A~	200
4	INFLUE PMP4 VFD	INFLUE PMP4 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	150A~	200
5	INFLUE PMP5 VFD	INFLUE PMP5 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	150A~	200
6	INFLUE PMP6 VFD	INFLUE PMP6 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	100A	200
7	INFLUE PMP7 VFD	INFLUE PMP7 VFD	0.48	Feeder	BUSS	(Std)	JKS(J)	100A	200
8	MCCA1-1A	MCCA1	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	600A	200
9	MCCA1-3A	MCCA1	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	100A	200
10	MCCA1-3B	MCCA1	0.48	Feeder	Littelfuse	General Purpose	FLSR(RK5)	10A	200
11	MCCA1-3C	MCCA1	0.48	Feeder	BUSS	(Std)	FRS-R(RK5).1-12	8A	200
12	MCCA1-3D	MCCA1	0.48	Feeder	Littelfuse	General Purpose	FLSR(RK5)	1.6A	200
13	MCCA1-4B	MCCA1	0.48	Feeder	Littelfuse	General Purpose	FLSR(RK5)	10A	200
14	MCCA1-4C	MCCA1	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	1.6A	200
15	MCCA1-4D	MCCA1	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	250A~	200
16	MCCA1-7A	MCCA1	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	400A	200
17	MCCA1-7C	MCCA1	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	30A	200
18	MCCA2-2D	MCCA2	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	200A	200
19	MCCA2-5A	MCCA2	0.48	Feeder	Littelfuse	General Purpose	FLSR(RK5)	10A	200
20	MCCA2-5B	MCCA2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	70A~	200
21	MCCA2-5B_A	MCCA2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	40A	200
22	MCCA2-5D	MCCA2	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	400A	200
23	MCCA2-6A	MCCA2	0.48	Feeder	Littelfuse	General Purpose	FLSR(RK5)	6A	200
24	MCCA2-6B	MCCA2	0.48	Feeder	BUSS	(Std)	FRS-R(RK5).1-12	6.2A	200
25	MCCA2-6C	MCCA2	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	1.6A	200
26	MCCA2-6D	MCCA2	0.48	Feeder	BUSS	(Std)	LPS-RK(RK-1)	1.6A	200
27	MS1-3A XFR SW A1	MS1	0.48	Feeder	Gould Shawmut	(Std)	A4BY (L)	800A	200
28	MS1-3B XFR SW A2	MS1	0.48	Feeder	BUSS	(Std)	KTU(L)	800A	200

ATSs

	ID Name	Status	Base kV	Area	Zone	Material	AF Type	AF Solution	Forced To	AF Option	Forced WD	WD Value	Orientation	Source Connection	Model	Comment
1	ATS-A1	On	0.48	1	1	Other	ATS	Calculate		TCC	Default		Vertical	Source 1 Bus	Switch	
2	ATS-A2	On	0.48	1	1	Other	ATS	Calculate		TCC	Default		Vertical	Source 2 Bus	Switch	

OECC MS2 & MS3

Summary

1	Base MVA	10
2	Frequency	60
3	Buses	187
4	MCC Schedules	0
5	Panel Schedules	0
6	Utilities	2
7	Generators	1
8	UPS	0
9	Motors	118
10	Capacitors	0
11	Loads	0
12	Shunts	0
13	Filters	0
14	2-Transformers	0
15	3-Transformers	0
16	Zigzags	0
17	Cables	181
18	Busways	0
19	Xmission Lines	0
20	CL Reactors	0
21	HV Breakers	0
22	LV Breakers	79
23	Switches	31
24	Fuses	55
25	ATS	2
26	Meters	0
27	CTs	0
28	Relays	0
29	Notes	13
30	Lines	0
31	Total Buses/Nodes	189

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
1	ABC -01	0.48			Other
2	AC 1 ACCU-1	0.48			Other
3	AC 1 ACCU-1 DS	0.48			Other
4	AER 7 MIXERS	0.48			Other
5	AER 8 MIXERS	0.48			Other
6	AER 9 MIXERS	0.48			Other
7	AER 10 MIXERS	0.48			Other
8	AER 11 MIXERS	0.48			Other
9	AER 12 MIXERS	0.48			Other
10	AER 13 MIXERS	0.48			Other
11	AER 14 MIXERS	0.48			Other
12	AER 15 MIXERS	0.48			Other
13	AER 16 MIXERS	0.48			Other
14	AER 17 MIXERS	0.48			Other
15	AER 18 MIXERS	0.48			Other
16	AERATION BLWR 1	0.48			Other
17	AERATION BLWR 2	0.48			Other
18	AERATION BLWR 3	0.48			Other
19	AERATION BLWR 4	0.48			Other
20	AERATION BLWR 5	0.48			Other
21	AERTANK7 MIXERA	0.48			Other
22	AERTANK7 MIXERB	0.48			Other
23	AERTANK7 MIXERC	0.48			Other
24	AERTANK8 MIXERA	0.48			Other
25	AERTANK8 MIXERB	0.48			Other
26	AERTANK8 MIXERC	0.48			Other
27	AERTANK8 MIXERD	0.48			Other
28	AERTANK9 MIXERA	0.48			Other
29	AERTANK9 MIXERB	0.48			Other
30	AERTANK9 MIXERC	0.48			Other
31	AERTANK9 MIXERD	0.48			Other
32	AERTANK10 MIXERA	0.48			Other
33	AERTANK10 MIXERB	0.48			Other
34	AERTANK10 MIXERC	0.48			Other
35	AERTANK11 MIXERA	0.48			Other
36	AERTANK11 MIXERB	0.48			Other
37	AERTANK11 MIXERC	0.48			Other
38	AERTANK11 MIXERD	0.48			Other
39	AERTANK12 MIXERA	0.48			Other
40	AERTANK12 MIXERB	0.48			Other
41	AERTANK12 MIXERC	0.48			Other
42	AERTANK12 MIXERD	0.48			Other
43	AERTANK13 MIXERA	0.48			Other
44	AERTANK13 MIXERB	0.48			Other
45	AERTANK13 MIXERC	0.48			Other
46	AERTANK13 MIXERD	0.48			Other
47	AERTANK14 MIXERA	0.48			Other
48	AERTANK14 MIXERB	0.48			Other
49	AERTANK14 MIXERC	0.48			Other
50	AERTANK14 MIXERD	0.48			Other
51	AERTANK15 MIXERA	0.48			Other
52	AERTANK15 MIXERB	0.48			Other
53	AERTANK15 MIXERC	0.48			Other
54	AERTANK16 MIXERA	0.48			Other
55	AERTANK16 MIXERB	0.48			Other
56	AERTANK16 MIXERC	0.48			Other
57	AERTANK16 MIXERD	0.48			Other
58	AERTANK17 MIXERA	0.48			Other
59	AERTANK17 MIXERB	0.48			Other
60	AERTANK17 MIXERC	0.48			Other
61	AERTANK17 MIXERD	0.48			Other

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
62	AERTANK18 MIXERA	0.48			Other
63	AERTANK18 MIXERB	0.48			Other
64	AERTANK18 MIXERC	0.48			Other
65	BRIDGE 1 DS	0.48			Other
66	BRIDGE 2 DS	0.48			Other
67	BRIDGE 3 DS	0.48			Other
68	BRIDGE 4 DS	0.48			Other
69	BRIDGE 5 DS	0.48			Other
70	BRIDGE 6 DS	0.48			Other
71	CENFUGE BACK VFD	0.48			Other
72	CENFUGE MAIN VFD	0.48			Other
73	CENTRIFUGE CP	0.48			Other
74	CFP-01-VFD	0.48			Other
75	CFP-02-VFD	0.48			Other
76	CLAR 5 CLCTR DS	0.48			Other
77	CLAR 5 CTRL	0.48			Other
78	CLAR 5 FLCTR DS	0.48			Other
79	CLAR 6 CLCTR DS	0.48			Other
80	CLAR 6 CTRL	0.48			Other
81	CLAR 6 FLCTR DS	0.48			Other
82	CLAR 7 CLCTR DS	0.48			Other
83	CLAR 7 CTRL	0.48			Other
84	CLAR 7 FLCTR DS	0.48			Other
85	CLAR 8 CLCTR DS	0.48			Other
86	CLAR 8 CTRL	0.48			Other
87	CLAR 8 FLCTR DS	0.48			Other
88	CRANE DBC-01 DS	0.48			Other
89	DIG BLOWER 3	0.48			Other
90	DIG BLWR 1	0.48			Other
91	DIG BLWR 2	0.48			Other
92	DIG SLG PMP 1	0.48			Other
93	DIG SLG PMP 2	0.48			Other
94	DPT	0.48			Other
95	DPT-2_4_6 MAIN	0.48			Other
96	EDH-A1	0.48			Other
97	EDH-A2	0.48			Other
98	EF-2 DS	0.48			Other
99	EF-3 DS	0.48			Other
100	EL H20 HTR	0.48			Other
101	EXF-B1	0.48			Other
102	EXF-B1A	0.48			Other
103	EXF-B2	0.48			Other
104	EXF-B3	0.48			Other
105	EXF-B4	0.48			Other
106	EXF-B5	0.48			Other
107	EXF-B6	0.48			Other
108	EXF-S1	0.48			Other
109	EXF-S2	0.48			Other
110	EXF-S3	0.48			Other
111	EXF-S4	0.48			Other
112	EXF-S5	0.48			Other
113	EXF-S6	0.48			Other
114	EXF-S8	0.48			Other
115	EXF-S9	0.48			Other
116	EXF-T1 DS	0.48			Other
117	EXF-T2 DS	0.48			Other
118	FAF-B1	0.48			Other
119	FAF-S1	0.48			Other
120	FUME EXH FAN DS	0.48			Other
121	FUME SUP FAN DS	0.48			Other
122	GEN2	0.48			Other

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
123	GRAVTY BELT	0.48			Other
124	GRD-01-CP	0.48			Other
125	H20 HTR EWH-1	0.48			Other
126	H20 HTR EWH-1 DS	0.48			Other
127	HBC-01	0.48			Other
128	HU-A1	0.48			Other
129	HU-A1 AUX	0.48			Other
130	HU-A2	0.48			Other
131	HU-A2 AUX	0.48			Other
132	HU-A4	0.48			Other
133	HU-A4 AUX	0.48			Other
134	HU-B9	0.48			Other
135	HU-S9	0.48			Other
136	HU-T3	0.48			Other
137	ISC-01	0.48			Other
138	JIB CRANE DS	0.48			Other
139	LTG CONTACTOR 1	0.48			Other
140	MCCAD	0.48			Other
141	MCCAD-1G MAIN	0.48			Other
142	MCCB1	0.48			Other
143	MCCB2	0.48			Other
144	MCCB3	0.48			Other
145	MCCDWB	0.48			Other
146	MCCDWB-1B	0.48			Other
147	MCCST1	0.48			Other
148	MCCST2	0.48			Other
149	MCCST2-1A	0.48			Other
150	MCCT	0.48			Other
151	MCCT-1E	0.48			Other
152	MS2	0.48			Other
153	MS2-1B	0.48			Other
154	MS3	0.48			Other
155	MS3(EM)	0.48			Other
156	MS3-1B (MAIN)	0.48			Other
157	OH DOOR 101-3 DS	0.48			Other
158	OH DOOR 101-4 DS	0.48			Other
159	OH DOOR 103-2 DS	0.48			Other
160	OH DOOR 103-3 DS	0.48			Other
161	PBF-01	0.48			Other
162	PBF-01 DS	0.48			Other
163	PBF-02	0.48			Other
164	PBF-02 DS	0.48			Other
165	RAS PUMP 1 DS	0.48			Other
166	RAS PUMP 2 DS	0.48			Other
167	RAS PUMP 3 DS	0.48			Other
168	RAS PUMP 4 DS	0.48			Other
169	RAS PUMP 5 DS	0.48			Other
170	RF-B1	0.48			Other
171	RF-B7	0.48			Other
172	SCUM MIXER DS	0.48			Other
173	SCUM PUMP 1 DS	0.48			Other
174	SCUM PUMP 2 DS	0.48			Other
175	SITE LIGHTING	0.48			Other
176	SLDG TANK BLWR 3	0.48			Other
177	SLDG TANK BLWR 4	0.48			Other
178	SLDGE TNK BLWR 1	0.48			Other
179	SLDGE TNK BLWR 2	0.48			Other
180	SMP PMP CTRL PNL	0.48			Other
181	STRG BLDG FEED	0.48			Other
182	SUMP PUMP CP	0.48			Other
183	THK SLDG PMP DS	0.48			Other

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
184	THK SLDG PMP VFD	0.48			Other
185	UTX-2 SEC_A	0.48			Other
186	UTX-3 SEC	0.48			Other
187	WAS PUMP DS	0.48			Other

Utilities

	ID Name	To bus	Base kV	Util kV	Fault Unit	3Ph SC1	3Ph SC2	SLG SC1	SLG SC2
1	104-866-260-1	UTX-2 SEC_A	0.48	0.48	kA	1.582	2.68	1.069	2.55
2	106-066-260-1	UTX-3 SEC	0.48	0.48	kA	4.954	3.08	3.584	2.42

Generators

	ID Name	Status	To bus	Base kV	Gen kV	Conn	MVA	Type	Power Factor	Efficiency	RPM	X/R	X"dv	X'dv	X0
1	GEN-2	Off	GEN2	0.48	0.48	YG	1.5	SYN-S	0.8	0.95	3600	24.604	15	20	2

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
1	C-1	MS2	0.48	MCCST1	0.48	U.S.	1/C	3	600	40	THWN	1260	1260	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
2	C-2_A	UTX-2 SEC_A	0.48	MS2-1B	0.48	U.S.	1/C	4	500	50	THWN	1520	1520	Copper	Conduit	0.025	0.0298	0.0501	0.0596	0.0038	0.0038
3	C-3	MCCST2	0.48	CFP-01-VFD	0.48	U.S.	1/C	1	10	78	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
4	C-4	MCCST2	0.48	MCCDWB-1B	0.48	U.S.	1/C	1	500	402	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
5	C-6	MS2	0.48	ATS-S1:Src Bus 1	0.48	U.S.	1/C	4	600	40	THWN	1680	1680	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
6	C-7	MCCST1	0.48	DIG BLOWER 3	0.48	U.S.	1/C	1	2/0	34	THWN	175	175	Copper	Conduit	0.0888	0.0399	0.3553	0.1595	0.0059	0.0059
7	C-7_A	MCCST1	0.48	SLDG TANK BLWR 3	0.48	U.S.	1/C	1	350	69	THWN	310	310	Copper	Conduit	0.0357	0.0381	0.1426	0.1524	0.0045	0.0045
8	C-7_B	MCCST1	0.48	SLDG TANK BLWR 4	0.48	U.S.	1/C	1	350	77	THWN	310	310	Copper	Conduit	0.0357	0.0381	0.1426	0.1524	0.0045	0.0045
9	C-7_E	MCCST1	0.48	THK SLDG PMP DS	0.48	U.S.	1/C	1	8	47	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
10	C-7_F	MCCST1	0.48	DIG SLG PMP 2	0.48	U.S.	1/C	1	8	27	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
11	C-7_G	MCCST1	0.48	DIG SLG PMP 1	0.48	U.S.	1/C	1	8	30	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
12	C-7_H	THK SLDG PMP DS	0.48	THK SLDG PMP VFD	0.48	U.S.	1/C	1	8	15	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
13	C-15	MCCST1	0.48	GRAVTY BELT	0.48	U.S.	1/C	1	10	66	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
14	C-15_A	MCCST1	0.48	HU-S9	0.48	U.S.	1/C	1	12	30	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
15	C-17	CENTRIFUGE CP	0.48	CENFUGE MAIN VFD	0.48	U.S.	1/C	1	2	10	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
16	C-19	MCCST2	0.48	DIG BLWR 1	0.48	U.S.	1/C	1	2/0	32	THWN	175	175	Copper	Conduit	0.0888	0.0399	0.3553	0.1595	0.0059	0.0059
17	C-19_A	MCCST2	0.48	DIG BLWR 2	0.48	U.S.	1/C	1	2/0	30	THWN	175	175	Copper	Conduit	0.0888	0.0399	0.3553	0.1595	0.0059	0.0059
18	C-19_B	MCCST2	0.48	SLDGE TNK BLWR 1	0.48	U.S.	1/C	1	350	57	THWN	310	310	Copper	Conduit	0.0357	0.0381	0.1426	0.1524	0.0045	0.0045
19	C-19_C	MCCST2	0.48	SLDGE TNK BLWR 2	0.48	U.S.	1/C	1	350	65	THWN	310	310	Copper	Conduit	0.0357	0.0381	0.1426	0.1524	0.0045	0.0045
20	C-19_D	MCCST2	0.48	EXF-S1	0.48	U.S.	1/C	1	12	80	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
21	C-19_E	MCCST2	0.48	EXF-S2	0.48	U.S.	1/C	1	12	75	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
22	C-19_F	MCCST2	0.48	EXF-S3	0.48	U.S.	1/C	1	12	60	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
23	C-19_G	MCCST2	0.48	EXF-S4	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
24	C-19_H	MCCST2	0.48	SMP PMP CTRL PNL	0.48	U.S.	1/C	1	12	57	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
25	C-19_P	MCCST2	0.48	LTG CONTACTOR 1	0.48	U.S.	1/C	1	10	53	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
26	C-19_Q	MCCST2	0.48	EXF-S5	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
27	C-19_R	MCCST2	0.48	EXF-S6	0.48	U.S.	1/C	1	12	60	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
28	C-19_S	MCCST2	0.48	FAF-S1	0.48	U.S.	1/C	1	12	75	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
29	C-19_T	MCCST2	0.48	EXF-S8	0.48	U.S.	1/C	1	12	85	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
30	C-19_U	MCCST2	0.48	EXF-S9	0.48	U.S.	1/C	1	12	90	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
31	C-20	MCCST2	0.48	MCCT-1E	0.48	U.S.	1/C	1	500	129	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
32	C-21	GEN2	0.48	MS3(EM)	0.48	U.S.	1/C	4	600	100	THWN	1680	1680	Copper	Conduit	0.0213	0.03	0.0426	0.06	0.004	0.004
33	C-22	MS3(EM)	0.48	ATS-S1:Src Bus 2	0.48	U.S.	1/C	3	500	110	THWN	1140	1140	Copper	Conduit	0.025	0.0298	0.0501	0.0596	0.0038	0.0038
34	C-22_A	MS3(EM)	0.48	ATS-B2:Src Bus 1	0.48	U.S.	1/C	4	600	40	THWN	1680	1680	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
35	C-29	MCCT	0.48	HU-T3	0.48	U.S.	1/C	1	10	40	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
36	C-29_A	MCCT	0.48	EXF-T2 DS	0.48	U.S.	1/C	1	10	240	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
37	C-29_B	MCCT	0.48	EXF-T1 DS	0.48	U.S.	1/C	1	10	218	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
38	C-29_C	MCCT	0.48	DPT-2_4_6 MAIN	0.48	U.S.	1/C	1	1	20	THWN	130	130	Copper	Conduit	0.1413	0.0416	0.5651	0.1663	0.0072	0.0072
39	C-30_AA	MCCB3	0.48	AER 14 MIXERS	0.48	U.S.	1/C	1	8	100	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
40	C-30_AB	MCCB3	0.48	AER 15 MIXERS	0.48	U.S.	1/C	1	8	130	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
41	C-30_AC	MCCB3	0.48	AER 16 MIXERS	0.48	U.S.	1/C	1	8	150	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
42	C-30_AD	MCCB3	0.48	AER 17 MIXERS	0.48	U.S.	1/C	1	8	180	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
43	C-30_AE	MCCB3	0.48	AER 18 MIXERS	0.48	U.S.	1/C	1	8	200	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
44	C-30_H	AER 7 MIXERS	0.48	AERTANK7 MIXERB	0.48	U.S.	1/C	1	12	67	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
45	C-30_I	AER 8 MIXERS	0.48	AERTANK8 MIXERB	0.48	U.S.	1/C	1	12	77	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
46	C-30_J	AER 9 MIXERS	0.48	AERTANK9 MIXERB	0.48	U.S.	1/C	1	12	95	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
47	C-30_K	AER 10 MIXERS	0.48	AERTANK10 MIXERB	0.48	U.S.	1/C	1	12	69	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
48	C-30_L	AER 11 MIXERS	0.48	AERTANK11 MIXERB	0.48	U.S.	1/C	1	12	79	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
49	C-30_M	AER 12 MIXERS	0.48	AERTANK12 MIXERB	0.48	U.S.	1/C	1	12	91	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
50	C-30_N	AER 13 MIXERS	0.48	AERTANK13 MIXERB	0.48	U.S.	1/C	1	12	90	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
51	C-30_O	AER 14 MIXERS	0.48	AERTANK14 MIXERB	0.48	U.S.	1/C	1	12	73	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
52	C-30_P	AER 15 MIXERS	0.48	AERTANK15 MIXERB	0.48	U.S.	1/C	1	12	69	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
53	C-30_Q	AER 16 MIXERS	0.48	AERTANK16 MIXERB	0.48	U.S.	1/C	1	12	88	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
54	C-30_R	AER 17 MIXERS	0.48	AERTANK17 MIXERB	0.48	U.S.	1/C	1	12	75	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
55	C-30_S	AER 18 MIXERS	0.48	AERTANK18 MIXERA	0.48	U.S.	1/C	1	12	65	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
56	C-30_T	MCCB3	0.48	AER 7 MIXERS	0.48	U.S.	1/C	1	8	200	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
57	C-30_U	MCCB3	0.48	AER 8 MIXERS	0.48	U.S.	1/C	1	8	170	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
58	C-30_V	MCCB3	0.48	AER 9 MIXERS	0.48	U.S.	1/C	1	8	140	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
59	C-30_W	MCCB3	0.48	AER 10 MIXERS	0.48	U.S.	1/C	1	8	120	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
60	C-30_X	MCCB3	0.48	AER 11 MIXERS	0.48	U.S.	1/C	1	8	100	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
61	C-30_Y	MCCB3	0.48	AER 12 MIXERS	0.48	U.S.	1/C	1	8	80	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
62	C-30_Z	MCCB3	0.48	AER 13 MIXERS	0.48	U.S.	1/C	1	8	80	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
63	C-31	CENTRIFUGE CP	0.48	CENFUGE BACK VFD	0.48	U.S.	1/C	1	2	10	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
64	C-32	MS3	0.48	ATS-B2:Src Bus 2	0.48	U.S.	1/C	4	600	60	THWN	1680	1680	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
65	C-34	ATS-B2:Load Bus	0.48	MCCB2	0.48	U.S.	1/C	4	600	40	THWN	1680	1680	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
66	C-36	MCCB2	0.48	AERATION BLWR 2	0.48	U.S.	1/C	2	4/0	52	THWN	460	460	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
67	C-36_A	MCCB2	0.48	AERATION BLWR 1	0.48	U.S.	1/C	2	4/0	44	THWN	460	460	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
68	C-37	MCCB2	0.48	RAS PUMP 1 DS	0.48	U.S.	1/C	1	6	140	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
69	C-37_A	MCCB2	0.48	RAS PUMP 2 DS	0.48	U.S.	1/C	1	6	150	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
70	C-37_B	MCCB2	0.48	RAS PUMP 3 DS	0.48	U.S.	1/C	1	6	140	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
71	C-37_C	MCCB2	0.48	SCUM MIXER DS	0.48	U.S.	1/C	1	12	100	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
72	C-38	MCCB2	0.48	MCCAD-1G MAIN	0.48	U.S.	1/C	1	500	180	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
73	C-39	MCCB2	0.48	MCCB3	0.48	U.S.	1/C	1	500	10	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
74	C-3_A	MCCST2	0.48	CFP-02-VFD	0.48	U.S.	1/C	1	10	68	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
75	C-3_B	MCCST2	0.48	GRD-01-CP	0.48	U.S.	1/C	1	10	78	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
76	C-40	MCCAD	0.48	FUME EXH FAN DS	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
77	C-40_A	MCCAD	0.48	FUME SUP FAN DS	0.48	U.S.	1/C	1	12	60	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
78	C-41	MCCAD	0.48	EDH-A2	0.48	U.S.	1/C	1	6	50	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
79	C-41_A	MCCAD	0.48	EDH-A1	0.48	U.S.	1/C	1	6	55	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
80	C-41_B	MCCAD	0.48	EL H20 HTR	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
81	C-43	ATS-S1:Load Bus	0.48	MCCST2-1A	0.48	U.S.	1/C	4	600	45	THWN	1680	1680	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
82	C-44	MCCAD	0.48	HU-A4	0.48	U.S.	1/C	1	10	28	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
83	C-44_A	MCCAD	0.48	HU-A2	0.48	U.S.	1/C	1	10	40	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
84	C-44_B	MCCAD	0.48	HU-A1	0.48	U.S.	1/C	1	10	40	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
85	C-44_C	MCCAD	0.48	HU-A4 AUX	0.48	U.S.	1/C	1	12	35	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
86	C-44_D	MCCAD	0.48	HU-A2 AUX	0.48	U.S.	1/C	1	12	45	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
87	C-44_E	MCCAD	0.48	HU-A1 AUX	0.48	U.S.	1/C	1	12	45	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
88	C-45	MCCB3	0.48	FAF-B1	0.48	U.S.	1/C	1	12	130	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
89	C-45_A	MCCB3	0.48	RF-B1	0.48	U.S.	1/C	1	12	90	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
90	C-45_B	MCCB3	0.48	RF-B7	0.48	U.S.	1/C	1	12	71	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
91	C-45_C	MCCB3	0.48	EXF-B1A	0.48	U.S.	1/C	1	10	60	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
92	C-45_D	MCCB3	0.48	EXF-B1	0.48	U.S.	1/C	1	12	160	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
93	C-45_E	MCCB3	0.48	EXF-B6	0.48	U.S.	1/C	1	12	69	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
94	C-45_F	MCCB3	0.48	EXF-B5	0.48	U.S.	1/C	1	12	58	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
95	C-45_G	MCCB3	0.48	EXF-B4	0.48	U.S.	1/C	1	12	50	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
96	C-45_H	MCCB3	0.48	EXF-B3	0.48	U.S.	1/C	1	12	42	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
97	C-45_I	MCCB3	0.48	EXF-B2	0.48	U.S.	1/C	1	12	31	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
98	C-47_C	MCCB3	0.48	CLAR 6 CLCTR DS	0.48	U.S.	1/C	1	10	300	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
99	C-47_D	MCCB3	0.48	CLAR 6 FLCTR DS	0.48	U.S.	1/C	1	10	300	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
100	C-47_E	MCCB3	0.48	SUMP PUMP CP	0.48	U.S.	1/C	1	10	260	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
101	C-47_F	MCCB3	0.48	CLAR 6 CTRL	0.48	U.S.	1/C	1	10	260	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
102	C-47_G	MCCB3	0.48	CLAR 5 CLCTR DS	0.48	U.S.	1/C	1	10	275	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
103	C-47_H	MCCB3	0.48	CLAR 5 FLCTR DS	0.48	U.S.	1/C	1	10	275	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
104	C-47_I	MCCB3	0.48	CLAR 5 CTRL	0.48	U.S.	1/C	1	10	235	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
105	C-47_J	MCCB3	0.48	HU-B9	0.48	U.S.	1/C	1	12	135	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
106	C-47_K	MCCB3	0.48	CLAR 8 CLCTR DS	0.48	U.S.	1/C	1	10	265	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
107	C-47_L	MCCB3	0.48	CLAR 8 FLCTR DS	0.48	U.S.	1/C	1	10	265	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
108	C-47_M	MCCB3	0.48	CLAR 8 CTRL	0.48	U.S.	1/C	1	10	225	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
109	C-47_N	MCCB3	0.48	CLAR 7 CLCTR DS	0.48	U.S.	1/C	1	10	310	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
110	C-47_O	MCCB3	0.48	CLAR 7 FLCTR DS	0.48	U.S.	1/C	1	10	310	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
111	C-47_P	MCCB3	0.48	CLAR 7 CTRL	0.48	U.S.	1/C	1	10	270	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
112	C-47_Q	MCCB3	0.48	SCUM PUMP 1 DS	0.48	U.S.	1/C	1	12	150	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
113	C-47_R	MCCB3	0.48	SCUM PUMP 2 DS	0.48	U.S.	1/C	1	4	140	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
114	C-47_S	MCCB3	0.48	WAS PUMP DS	0.48	U.S.	1/C	1	12	160	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
115	C-48	MS3	0.48	MCCB1	0.48	U.S.	1/C	4	600	50	THWN	1680	1680	Copper	Conduit	0.0226	0.0375	0.0906	0.1501	0.004	0.004
116	C-50	MCCB1	0.48	RAS PUMP 4 DS	0.48	U.S.	1/C	1	6	160	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
117	C-50_A	MCCB1	0.48	RAS PUMP 5 DS	0.48	U.S.	1/C	1	6	180	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
118	C-50_B	MCCB1	0.48	AERATION BLWR 3	0.48	U.S.	1/C	2	4/0	68	THWN	460	460	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
119	C-50_C	MCCB1	0.48	AERATION BLWR 4	0.48	U.S.	1/C	2	4/0	77	THWN	460	460	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
120	C-50_D	MCCB1	0.48	AERATION BLWR 5	0.48	U.S.	1/C	2	4/0	86	THWN	460	460	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
121	C-51	UTX-3 SEC	0.48	MS3-1B (MAIN)	0.48	U.S.	1/C	5	600	100	THWN	2100	2100	Copper	Conduit	0.0213	0.03	0.0426	0.06	0.004	0.004
122	C-54_AA	AER 12 MIXERS	0.48	AERTANK12 MIXERC	0.48	U.S.	1/C	1	12	57	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
123	C-54_AB	AER 13 MIXERS	0.48	AERTANK13 MIXERA	0.48	U.S.	1/C	1	12	110	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
124	C-54_AC	AER 13 MIXERS	0.48	AERTANK13 MIXERD	0.48	U.S.	1/C	1	12	23	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
125	C-54_AD	AER 13 MIXERS	0.48	AERTANK13 MIXERC	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
126	C-54_AE	AER 14 MIXERS	0.48	AERTANK14 MIXERA	0.48	U.S.	1/C	1	12	102	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
127	C-54_AF	AER 14 MIXERS	0.48	AERTANK14 MIXERC	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
128	C-54_AG	AER 14 MIXERS	0.48	AERTANK14 MIXERD	0.48	U.S.	1/C	1	12	25	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
129	C-54_AH	AER 15 MIXERS	0.48	AERTANK15 MIXERA	0.48	U.S.	1/C	1	12	85	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
130	C-54_AI	AER 15 MIXERS	0.48	AERTANK15 MIXERC	0.48	U.S.	1/C	1	12	42	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
131	C-54_AJ	AER 16 MIXERS	0.48	AERTANK16 MIXERA	0.48	U.S.	1/C	1	12	103	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
132	C-54_AK	AER 16 MIXERS	0.48	AERTANK16 MIXERD	0.48	U.S.	1/C	1	12	22	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
133	C-54_AL	AER 16 MIXERS	0.48	AERTANK16 MIXERC	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
134	C-54_AM	AER 17 MIXERS	0.48	AERTANK17 MIXERA	0.48	U.S.	1/C	1	12	103	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
135	C-54_AN	AER 17 MIXERS	0.48	AERTANK17 MIXERC	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
136	C-54_AO	AER 17 MIXERS	0.48	AERTANK17 MIXERD	0.48	U.S.	1/C	1	12	22	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
137	C-54_AP	AER 18 MIXERS	0.48	AERTANK18 MIXERB	0.48	U.S.	1/C	1	12	79	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
138	C-54_AQ	AER 18 MIXERS	0.48	AERTANK18 MIXERC	0.48	U.S.	1/C	1	12	36	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
139	C-54_K	AER 7 MIXERS	0.48	AERTANK7 MIXERA	0.48	U.S.	1/C	1	12	87	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
140	C-54_M	AER 7 MIXERS	0.48	AERTANK7 MIXERC	0.48	U.S.	1/C	1	12	35	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
141	C-54_N	AER 8 MIXERS	0.48	AERTANK8 MIXERC	0.48	U.S.	1/C	1	12	60	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
142	C-54_O	AER 8 MIXERS	0.48	AERTANK8 MIXERA	0.48	U.S.	1/C	1	12	25	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
143	C-54_P	AER 8 MIXERS	0.48	AERTANK8 MIXERD	0.48	U.S.	1/C	1	12	97	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
144	C-54_Q	AER 9 MIXERS	0.48	AERTANK9 MIXERA	0.48	U.S.	1/C	1	12	111	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
145	C-54_R	AER 9 MIXERS	0.48	AERTANK9 MIXERD	0.48	U.S.	1/C	1	12	31	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
146	C-54_S	AER 9 MIXERS	0.48	AERTANK9 MIXERC	0.48	U.S.	1/C	1	12	68	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
147	C-54_T	AER 10 MIXERS	0.48	AERTANK10 MIXERA	0.48	U.S.	1/C	1	12	88	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
148	C-54_U	AER 10 MIXERS	0.48	AERTANK10 MIXERC	0.48	U.S.	1/C	1	12	44	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
149	C-54_V	AER 11 MIXERS	0.48	AERTANK11 MIXERA	0.48	U.S.	1/C	1	12	105	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
150	C-54_W	AER 11 MIXERS	0.48	AERTANK11 MIXERC	0.48	U.S.	1/C	1	12	57	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
151	C-54_X	AER 11 MIXERS	0.48	AERTANK11 MIXERD	0.48	U.S.	1/C	1	12	32	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
152	C-54_Y	AER 12 MIXERS	0.48	AERTANK12 MIXERA	0.48	U.S.	1/C	1	12	112	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
153	C-54_Z	AER 12 MIXERS	0.48	AERTANK12 MIXERD	0.48	U.S.	1/C	1	12	25	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
154	EWH-1 FDR_A	MCCDWB	0.48	EF-2 DS	0.48	U.S.	1/C	1	12	70	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
155	EWH-1 FDR_AA	AC 1 ACCU-1 DS	0.48	AC 1 ACCU-1	0.48	U.S.	1/C	1	12	10	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
156	EWH-1 FDR_AB	H20 HTR EWH-1 DS	0.48	H20 HTR EWH-1	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
157	EWH-1 FDR_B	MCCDWB	0.48	EF-3 DS	0.48	U.S.	1/C	1	12	75	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
158	EWH-1 FDR_C	MCCDWB	0.48	PBF-01 DS	0.48	U.S.	1/C	1	12	33	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
159	EWH-1 FDR_D	MCCDWB	0.48	PBF-02 DS	0.48	U.S.	1/C	1	12	41	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
160	EWH-1 FDR_E	MCCDWB	0.48	ISC-01	0.48	U.S.	1/C	1	12	48	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
161	EWH-1 FDR_F	MCCDWB	0.48	HBC-01	0.48	U.S.	1/C	1	12	28	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
162	EWH-1 FDR_G	MCCDWB	0.48	OH DOOR 103-3 DS	0.48	U.S.	1/C	1	12	98	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
163	EWH-1 FDR_H	MCCDWB	0.48	OH DOOR 101-3 DS	0.48	U.S.	1/C	1	12	98	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
164	EWH-1 FDR_I	MCCDWB	0.48	ABC -01	0.48	U.S.	1/C	1	12	42	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
165	EWH-1 FDR_J	MCCDWB	0.48	STRG BLDG FEED	0.48	U.S.	1/C	1	8	50	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
166	EWH-1 FDR_K	MCCDWB	0.48	AC 1 ACCU-1 DS	0.48	U.S.	1/C	1	12	30	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
167	EWH-1 FDR_L	MCCDWB	0.48	OH DOOR 101-4 DS	0.48	U.S.	1/C	1	12	69	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
168	EWH-1 FDR_M	MCCDWB	0.48	OH DOOR 103-2 DS	0.48	U.S.	1/C	1	12	30	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
169	EWH-1 FDR_N	MCCDWB	0.48	CRANE DBC-01 DS	0.48	U.S.	1/C	1	10	60	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
170	EWH-1 FDR_O	MCCDWB	0.48	H20 HTR EWH-1 DS	0.48	U.S.	1/C	1	12	55	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
171	EWH-1 FDR_P	MCCDWB	0.48	CENTRIFUGE CP	0.48	U.S.	1/C	1	2	25	THWN	115	115	Copper	Conduit	0.1782	0.0408	0.7128	0.1634	0.0067	0.0067
172	EWH-1 FDR_Q	DPT	0.48	BRIDGE 1 DS	0.48	U.S.	1/C	1	12	75	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
173	EWH-1 FDR_R	DPT	0.48	BRIDGE 3 DS	0.48	U.S.	1/C	1	12	120	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
174	EWH-1 FDR_S	DPT	0.48	BRIDGE 5 DS	0.48	U.S.	1/C	1	12	164	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
175	EWH-1 FDR_T	DPT	0.48	JIB CRANE DS	0.48	U.S.	1/C	1	12	60	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
176	EWH-1 FDR_U	DPT	0.48	SITE LIGHTING	0.48	U.S.	1/C	1	10	100	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
177	EWH-1 FDR_V	DPT	0.48	BRIDGE 2 DS	0.48	U.S.	1/C	1	12	111	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
178	EWH-1 FDR_W	DPT	0.48	BRIDGE 4 DS	0.48	U.S.	1/C	1	12	155	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
179	EWH-1 FDR_X	DPT	0.48	BRIDGE 6 DS	0.48	U.S.	1/C	1	12	198	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078
180	EWH-1 FDR_Y	PBF-01 DS	0.48	PBF-01	0.48	U.S.	1/C	1	12	10	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
181	EWH-1 FDR_Z	PBF-02 DS	0.48	PBF-02	0.48	U.S.	1/C	1	12	10	THWN	25	25	Copper	Conduit	1.819	0.0674	7.276	0.2695	0.0078	0.0078

LV Breakers

	ID Name	On Bus	Base kV	Class	Breaker Mfr	Breaker Style	Cont Current (A)	SC Int kA	Trip	Trip Mfr	Trip Type	Trip Style	Sensor/Frame	Plug/Tap/Trip	LTPU Setting	LTPU Mult	Trip (A)
1	DPT-2_4_6 MAIN	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (100AT)	100			100
2	DPT-7_9_11	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
3	DPT-8_10_12	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
4	DPT-13_15_17	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
5	DPT-14_16_18	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
6	DPT-19_21_23	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
7	DPT-20_22_24	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
8	DPT-25_27_29	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (15AT)	15			15
9	DPT-31_33_35	DPT	0.48	MCCB	Cutler Hammer	FD	225	25	TMGN	Cutler Hammer	Series C	FD	225A (20AT)	20			20
10	GEN2 CB	GEN2	0.48	MCCB	Merlin Gerin	CM	3200	85	SST	Merlin Gerin	CM	ST 316ST	CM 2500	2500	1		2500
11	MCCAD-1B	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (30AT)	30			30
12	MCCAD-1C	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (30AT)	30			30
13	MCCAD-1D	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (30AT)	30			30
14	MCCAD-1G MAIN	MCCAD	0.48	MCCB	Cutler Hammer	HLD	600	65	TMGN	Cutler Hammer	Series C	HLD	600A(300-600AT)	400			400
15	MCCAD-2A	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20
16	MCCAD-2C	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (40AT)	40			40
17	MCCAD-2D	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (60AT)	60			60
18	MCCAD-2E	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
19	MCCAD-2F	MCCAD	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
20	MCCB3-4A1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
21	MCCB3-4A2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
22	MCCB3-4B1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
23	MCCB3-4B2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
24	MCCB3-4C1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
25	MCCB3-4C2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
26	MCCB3-4D1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
27	MCCB3-4D2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
28	MCCB3-4E1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
29	MCCB3-4E2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
30	MCCB3-4F1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
31	MCCB3-4F2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (50AT)	50			50
32	MCCB3-5A	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
33	MCCB3-5B	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
34	MCCB3-5C1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
35	MCCB3-5C2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
36	MCCB3-5D	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
37	MCCB3-5E	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
38	MCCB3-5F1	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
39	MCCB3-5F2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
40	MCCB3-6A	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
41	MCCB3-6B	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
42	MCCB3-6C2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
43	MCCB3-6D	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
44	MCCB3-6E	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
45	MCCB3-6F2	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
46	MCCB3-7B	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20
47	MCCB3-7C	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (60AT)	60			60
48	MCCB3-7E	MCCB3	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20
49	MCCDWB-1B	MCCDWB	0.48	MCCB	Cutler Hammer	CHKD	400	65	SST	Cutler-Hammer	DT RMS 310	K-Frame	400	400	1		400
50	MCCDWB-2A	MCCDWB	0.48	MCCB	Cutler Hammer	HMCP	600	65	TMGN	Cutler Hammer	MCP	HMCP	150A (3-150T4)	3			3
51	MCCDWB-2C	MCCDWB	0.48	MCCB	Cutler Hammer	HMCP	600	65	TMGN	Cutler Hammer	MCP	HMCP	150A (3-150T4)	3			3
52	MCCDWB-2D1	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
53	MCCDWB-2D2	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
54	MCCDWB-3A	MCCDWB	0.48	MCCB	Cutler Hammer	HMCP	600	65	TMGN	Cutler Hammer	MCP	HMCP	150A (3-150T4)	7			7
55	MCCDWB-3B	MCCDWB	0.48	MCCB	Cutler Hammer	HMCP	600	65	TMGN	Cutler Hammer	MCP	HMCP	150A (3-150T4)	7			7
56	MCCDWB-3C1	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20
57	MCCDWB-3C2	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20
58	MCCDWB-4A	MCCDWB	0.48	MCCB	Cutler Hammer	HMCP	600	65	TMGN	Cutler Hammer	MCP	HMCP	150A (3-150T4)	7			7
59	MCCDWB-4B1	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (60AT)	60			60
60	MCCDWB-4B2	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
61	MCCDWB-4C1	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20

LV Breakers

	ID Name	LT Curve	LTD Band	STPU Setting	STPU Band	STPU I2T	STPU (A)	Maint Mode	Inst Setting	Inst (A)
1	DPT-2_4_6 MAIN								Fixed	
2	DPT-7_9_11								Fixed	
3	DPT-8_10_12								Fixed	
4	DPT-13_15_17								Fixed	
5	DPT-14_16_18								Fixed	
6	DPT-19_21_23								Fixed	
7	DPT-20_22_24								Fixed	
8	DPT-25_27_29								Fixed	
9	DPT-31_33_35								Fixed	
10	GEN2 CB		Fixed	8	0.3		20000		Fixed	35000
11	MCCAD-1B								Fixed	
12	MCCAD-1C								Fixed	
13	MCCAD-1D								Fixed	
14	MCCAD-1G MAIN								10	4000
15	MCCAD-2A								Fixed	
16	MCCAD-2C								Fixed	
17	MCCAD-2D								Fixed	
18	MCCAD-2E								Fixed	
19	MCCAD-2F								Fixed	
20	MCCB3-4A1								Fixed	
21	MCCB3-4A2								Fixed	
22	MCCB3-4B1								Fixed	
23	MCCB3-4B2								Fixed	
24	MCCB3-4C1								Fixed	
25	MCCB3-4C2								Fixed	
26	MCCB3-4D1								Fixed	
27	MCCB3-4D2								Fixed	
28	MCCB3-4E1								Fixed	
29	MCCB3-4E2								Fixed	
30	MCCB3-4F1								Fixed	
31	MCCB3-4F2								Fixed	
32	MCCB3-5A								Fixed	
33	MCCB3-5B								Fixed	
34	MCCB3-5C1								Fixed	
35	MCCB3-5C2								Fixed	
36	MCCB3-5D								Fixed	
37	MCCB3-5E								Fixed	
38	MCCB3-5F1								Fixed	
39	MCCB3-5F2								Fixed	
40	MCCB3-6A								Fixed	
41	MCCB3-6B								Fixed	
42	MCCB3-6C2								Fixed	
43	MCCB3-6D								Fixed	
44	MCCB3-6E								Fixed	
45	MCCB3-6F2								Fixed	
46	MCCB3-7B								Fixed	
47	MCCB3-7C								Fixed	
48	MCCB3-7E								Fixed	
49	MCCDWB-1B		Fixed	2	I2T (Fixe	Out	800		Fixed	4000
50	MCCDWB-2A								H	30
51	MCCDWB-2C								H	30
52	MCCDWB-2D1								Fixed	
53	MCCDWB-2D2								Fixed	
54	MCCDWB-3A								H	70
55	MCCDWB-3B								H	70
56	MCCDWB-3C1								Fixed	
57	MCCDWB-3C2								Fixed	
58	MCCDWB-4A								H	70
59	MCCDWB-4B1								Fixed	
60	MCCDWB-4B2								Fixed	
61	MCCDWB-4C1								Fixed	

LV Breakers

	ID Name	On Bus	Base kV	Class	Breaker Mfr	Breaker Style	Cont Current (A)	SC Int kA	Trip	Trip Mfr	Trip Type	Trip Style	Sensor/Frame	Plug/Tap/Trip	LTPU Setting	LTPU Mult	Trip (A)
62	MCCDWB-4C2	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (20AT)	20			20
63	MCCDWB-4D1	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (25AT)	25			25
64	MCCDWB-4D2	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (15AT)	15			15
65	MCCDWB-5A	MCCDWB	0.48	MCCB	West	HFD	225	65	TMGN	West	Series C	HFD	150A (90AT)	90			90
66	MCCST2-1A	MCCST2	0.48	MCCB	West	PCF	3000	100	SST	West	Seltronic	PC	1600-1800(Adj)	1600	1		1600
67	MCCT-1A	MCCT	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (100AT)	100			100
68	MCCT-1E	MCCT	0.48	MCCB	Cutler Hammer	KD	400	35	TMGN	Cutler Hammer	Series C	KD	400A(100-400AT)	400			400
69	MCCT-2A	MCCT	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (15AT)	15			15
70	MCCT-2B	MCCT	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (20AT)	20			20
71	MCCT-2C	MCCT	0.48	MCCB	Cutler Hammer	HFD	225	65	TMGN	Cutler Hammer	Series C	HFD	225A (20AT)	20			20
72	MS2-1B	MS2	0.48	LVPCB	Cutler-Hammer	DSII-632	3200	65	SST	Cutler-Hammer	DT 510	LVPCB	3200	2400	1		2400
73	MS2-2A	MS2	0.48	LVPCB	Cutler-Hammer	DSII-616	1600	65	SST	Cutler-Hammer	DT 510	LVPCB	1600	1200	1		1200
74	MS2-2B	MS2	0.48	LVPCB	Cutler-Hammer	DSII-616	1600	65	SST	Cutler-Hammer	DT 510	LVPCB	1600	1600	1		1600
75	MS3(EM)-1C	MS3(EM)	0.48	LVPCB	Cutler-Hammer	DSII-616	1600	65	SST	Cutler-Hammer	DT 510	LVPCB	1600	1200	1		1200
76	MS3(EM)-1D	MS3(EM)	0.48	LVPCB	Cutler-Hammer	DSII-616	1600	65	SST	Cutler-Hammer	DT 510	LVPCB	1600	1600	1		1600
77	MS3-2B	MS3	0.48	LVPCB	Cutler-Hammer	DSII-616	1600	65	SST	Cutler-Hammer	DT 510	LVPCB	1600	1600	1		1600
78	MS3-2C	MS3	0.48	LVPCB	Cutler-Hammer	DSII-616	1600	65	SST	Cutler-Hammer	DT 510	LVPCB	1600	1600	1		1600
79	MS3-IB (MAIN)	MS3	0.48	LVPCB	Cutler-Hammer	DSII-632	3200	65	SST	Cutler-Hammer	DT 510	LVPCB	3200	3200	1		3200

LV Breakers

	ID Name	LT Curve	LTD Band	STPU Setting	STPU Band	STPU I2T	STPU (A)	Maint Mode	Inst Setting	Inst (A)
62	MCCDWB-4C2								Fixed	
63	MCCDWB-4D1								Fixed	
64	MCCDWB-4D2								Fixed	
65	MCCDWB-5A								Fixed	
66	MCCST2-1A		Fixed	8x	Fixed	Out	12800		Fixed	34000
67	MCCT-1A								Fixed	
68	MCCT-1E								10	4000
69	MCCT-2A								Fixed	
70	MCCT-2B								Fixed	
71	MCCT-2C								Fixed	
72	MS2-1B		15s	3	0.5s	Out	7200		6	14400
73	MS2-2A		15s	3	0.3s	Out	3600		6	7200
74	MS2-2B		15s	3	0.3s	Out	4800		6	9600
75	MS3(EM)-1C		15s	3	0.3s	Out	3600		6	7200
76	MS3(EM)-1D		15s	2	0.3s	Out	3200		6	9600
77	MS3-2B		15s	2	0.3s	Out	3200		6	9600
78	MS3-2C		15s	2	0.3s	Out	3200		6	9600
79	MS3-IB (MAIN)		15s	2.5	0.5s	Out	8000		6	19200

Switches

	ID Name	Status	On Bus	Base kV	Conn Type	Normal State	Manufacturer	Type	Style	Cont Current (A)	SC Mom kA	SC Test Std	PCC kVA Demand	PCC Isc/ILoad	Comment
1	ATS-B2:Switch 2	On	ATS-B2:Load Bus	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
2	ATS-S1:Switch 1	On	ATS-S1:Load Bus	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
3	RAS PUMP 1	On	RAS PUMP 1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
4	RAS PUMP 2	On	RAS PUMP 2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
5	RASP PUMP3	On	RAS PUMP 3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
6	S-1	On	OH DOOR 101-4 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
7	S-2	On	EF-2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
8	S-3	On	EF-3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
9	S-4	On	OH DOOR 103-3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
10	S-5	On	OH DOOR 101-3 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
11	S-6	On	EXF-T2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
12	S-6_A	On	EXF-T1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
13	S-7	On	OH DOOR 103-2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
14	S-8	On	CRANE DBC-01 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
15	S-9	On	FUME EXH FAN DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
16	S-9_A	On	FUME SUP FAN DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
17	S-40	On	RAS PUMP 4 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
18	S-41	On	RAS PUMP 5 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
19	S-42	On	SCUM MIXER DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
20	S-43	On	FAF-B1	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
21	S-44	On	CLAR 6 CLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
22	S-45	On	CLAR 6 FLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
23	S-46	On	CLAR 5 CLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
24	S-47	On	CLAR 5 FLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
25	S-48	On	CLAR 8 CLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
26	S-49	On	CLAR 8 FLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
27	S-50	On	CLAR 7 CLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
28	S-51	On	CLAR 7 FLCTR DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
29	S-52	On	SCUM PUMP 1 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
30	S-53	On	SCUM PUMP 2 DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			
31	S-54	On	WAS PUMP DS	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			

Fuses

	ID Name	On Bus	Base kV	Conn Type	Manufacturer	Type	Style	TCC Size	SC Int kA
1	MCCAD-2G1	MCCAD	0.48	Feeder	BUSS	(Std)	FRS-R(RK5)	20A~	200
2	MCCAD-2H1	MCCAD	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	10A	200
3	MCCAD-2H2	MCCAD	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	10A	200
4	MCCB1-2C	MCCB1	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	50A	200
5	MCCB1-2D	MCCB1	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	50A	200
6	MCCB1-3A	MCCB1	0.48	Feeder	Ferraz Shawmut	Amp-Trap	AJT	500A	300
7	MCCB1-4A	MCCB1	0.48	Feeder	Ferraz Shawmut	Amp-Trap	AJT	500A	300
8	MCCB1-5A	MCCB1	0.48	Feeder	Ferraz Shawmut	Amp-Trap	AJT	500A	300
9	MCCB2-1A	MCCB2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	400A	200
10	MCCB2-2E	MCCB2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	400A	200
11	MCCB2-3A1	MCCB2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	50A	200
12	MCCB2-3A2	MCCB2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	50A	200
13	MCCB2-3B1	MCCB2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	50A	200
14	MCCB2-3C1	MCCB2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	20A	200
15	MCCB2-4A	MCCB2	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	500A	200
16	MCCB2-5A	MCCB2	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	500A	200
17	MCCB3-2A	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
18	MCCB3-2B	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
19	MCCB3-2C	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
20	MCCB3-2D	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
21	MCCB3-2E	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
22	MCCB3-2F	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
23	MCCB3-3A	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
24	MCCB3-3B	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
25	MCCB3-3C	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
26	MCCB3-3D	MCCB3	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	15A	200
27	MCCST1-2C	MCCST1	0.48	Feeder	Gould Shawmut	(Std)	A6D (RK1)	30A	200
28	MCCST1-2D	MCCST1	0.48	Feeder	Gould Shawmut	(Std)	A6D (RK1)	30A	200
29	MCCST1-2E	MCCST1	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	40A	200
30	MCCST1-3B1	MCCST1	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	30A	200
31	MCCST1-3B2	MCCST1	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	20A	200
32	MCCST1-4A	MCCST1	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	400A	200
33	MCCST1-5A	MCCST1	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	400A	200
34	MCCST1-6A	MCCST1	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	200A	200
35	MCCST2-2A	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	200A	200
36	MCCST2-3A	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	200A	200
37	MCCST2-4A	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	AJT(J)	400A	200
38	MCCST2-5A	MCCST2	0.48	Feeder	Littelfuse	POWR-PRO	JTD_ID(J)	400A	200
39	MCCST2-6B	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	20A	200
40	MCCST2-6C	MCCST2	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	20A	200
41	MCCST2-6E	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	400A	200
42	MCCST2-7A	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(0.1-12A)	2.25A~	200
43	MCCST2-7B	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(0.1-12A)	2.25A~	200
44	MCCST2-7C	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(0.1-12A)	2.25A~	200
45	MCCST2-8A	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(0.1-12A)	2.25A~	200
46	MCCST2-8B	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(0.1-12A)	3A~	200
47	MCCST2-8C	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(0.1-12A)	3A~	200
48	MCCST2-8D	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	30A	200
49	MCCST2-8E	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	15A	200
50	MCCST2-8F	MCCST2	0.48	Feeder	Gould Shawmut	(Std)	TRS(RK5)	15A	200
51	MCCST2-9B	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(RK5)	30A	200
52	MCCST2-9C	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(RK5)	30A	200
53	MCCST2-9D	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(RK5)	30A	200
54	MCCST2-9E	MCCST2	0.48	Feeder	BUSS	(Std)	FRS-R(RK5)	400A	200
55	THK SLDG PMP DS	THK SLDG PMP DS	0.48	Feeder	<None>	<None>	<None>		0

ATSs

	ID Name	Status	Base kV	Area	Zone	Material	AF Type	AF Solution	Forced To	AF Option	Forced WD	WD Value	Orientation	Source Connection	Model	Comment
1	ATS-B2	On	0.48	1	1	Other	ATS	Calculate		TCC	Default		Vertical	Source 2 Bus	Switch	
2	ATS-S1	On	0.48	1	1	Other	ATS	Calculate		TCC	Default		Vertical	Source 1 Bus	Switch	

TARTAN

Summary

1	Base MVA	10
2	Frequency	60
3	Buses	31
4	MCC Schedules	0
5	Panel Schedules	0
6	Utilities	1
7	Generators	1
8	UPS	0
9	Motors	13
10	Capacitors	0
11	Loads	0
12	Shunts	0
13	Filters	0
14	2-Transformers	1
15	3-Transformers	0
16	Zigzags	0
17	Cables	30
18	Busways	0
19	Xmission Lines	0
20	CL Reactors	0
21	HV Breakers	0
22	LV Breakers	17
23	Switches	1
24	Fuses	2
25	ATS	1
26	Meters	1
27	CTs	0
28	Relays	0
29	Notes	10
30	Lines	0
31	Total Buses/Nodes	32

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
1	BLOWER 1 AMMETER	0.48			Other
2	BLOWER 1 DS	0.48			Other
3	BLOWER 2 AMMETER	0.48			Other
4	BLOWER 2 DS	0.48			Other
5	BLOWER 3 DS	0.48			Other
6	BUS-1	12.47			Other
7	BUS-2	12.47			Other
8	BUS-3	0.48			Other
9	EXHAUST FAN DS	0.48			Other
10	GEAR DRIVE 1 DS	0.48			Other
11	GEAR DRIVE 2 DS	0.48			Other
12	HELISIEVE PANEL	0.48			Other
13	JBOX 1A	0.48			Other
14	JBOX 1B	0.48			Other
15	JBOX 1C	0.48			Other
16	KOHLER GEN	0.48			Other
17	MAIN FDS	0.48			Other
18	MASTER CP	0.48			Other
19	MC LEVEL IND. 1A	0.48			Other
20	MC LEVEL IND. 1B	0.48			Other
21	MC LEVEL IND. 1C	0.48			Other
22	METER 680627827	0.48			Other
23	MUDWELL PMP 1 DS	0.48			Other
24	MUDWELL PMP 2 DS	0.48			Other
25	PANEL M-1	0.48			Other
26	RAPIDSAND CP	0.48			Other
27	RAS PUMP NO.1 DS	0.48			Other
28	RAS PUMP NO.2 DS	0.48			Other
29	RAW PUMP NO.1 DS	0.48			Other
30	RAW PUMP NO.2 DS	0.48			Other
31	RAW PUMP NO.3 DS	0.48			Other

Utilities

	ID Name	To bus	Base kV	Util kV	Fault Unit	3Ph SC1	3Ph SC2	SLG SC1	SLG SC2
1	FIRST ENERG	BUS-1	12.47	12.47	kA	1508	2.99	993	2.99

Generators

	ID Name	Status	To bus	Base kV	Gen kV	Conn	MVA	Type	Power Factor	Efficiency	RPM	X/R	X"dv	X'dv	X0
1	KOHLER GEN	On	KOHLER GEN	0.48	0.48	YG	0.205	SYN-S	0.8	0.95	3600	12.87	17	20	9

2W-Xformers

	ID Name	From bus	From Base kV	From Conn	To Bus	To Base kV	To Conn	Type	Class	Temp	MVA	MVA O/L	Z	Z0	X/R
1	T128101	BUS-2	12.47	D	BUS-3	0.48	YG	Oil	OA	65	0.075	0.075	1.5	1.275	1.76

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
1	C-1	BUS-1	12.47	BUS-2	12.47	U.S.	1/C	1	3	204	XLPES	130		Copper	Conduit	0.2247	0.0567	0.4494	0.1133	0.042	0.042
2	C-2	BUS-3	0.48	METER 680627827	0.48	U.S.	1/C	1	500	50	THWN	380	380	Copper	Conduit	0.025	0.0298	0.0501	0.0596	0.0038	0.0038
3	C-3	MAIN FDS	0.48	ASCO ATS:Src Bus 2	0.48	U.S.	1/C	1	500	10	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
4	C-4	KOHLER GEN	0.48	ASCO ATS:Src Bus 1	0.48	U.S.	1/C	1	500	30	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
5	C-5	METER 680627	0.48	MAIN FDS	0.48	U.S.	1/C	1	500	10	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
6	C-6	ASCO ATS:Loa	0.48	PANEL M-1	0.48	U.S.	1/C	1	500	10	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
7	C-7	ASCO ATS:Loa	0.48	MASTER CP	0.48	U.S.	1/C	1	4/0	40	THWN	230	230	Copper	Conduit	0.0559	0.0385	0.2235	0.1539	0.0048	0.0048
8	C-8	PANEL M-1	0.48	HELISIEVE PANEL	0.48	U.S.	1/C	1	10	50	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
9	C-9	PANEL M-1	0.48	RAPIDSAND CP	0.48	U.S.	1/C	1	6	135	THWN	65	65	Copper	Conduit	0.4505	0.0422	1.802	0.1689	0.0078	0.0078
10	C-10	PANEL M-1	0.48	EXHAUST FAN DS	0.48	U.S.	1/C	1	10	100	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
11	C-11	RAPIDSAND C	0.48	MUDWELL PMP 1 DS	0.48	U.S.	1/C	1	10	100	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
12	C-12	RAPIDSAND C	0.48	MUDWELL PMP 2 DS	0.48	U.S.	1/C	1	10	100	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
13	C-13	MASTER CP	0.48	RAW PUMP NO.1 DS	0.48	U.S.	1/C	1	10	85	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
14	C-13_A	MASTER CP	0.48	RAW PUMP NO.2 DS	0.48	U.S.	1/C	1	10	85	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
15	C-13_B	MASTER CP	0.48	RAW PUMP NO.3 DS	0.48	U.S.	1/C	1	10	85	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
16	C-14	RAW PUMP N	0.48	JBOX 1A	0.48	U.S.	1/C	1	10	10	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
17	C-14_A	RAW PUMP N	0.48	JBOX 1B	0.48	U.S.	1/C	1	10	10	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
18	C-14_B	RAW PUMP N	0.48	JBOX 1C	0.48	U.S.	1/C	1	10	10	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
19	C-14_C	MASTER CP	0.48	BLOWER 1 AMMETER	0.48	U.S.	1/C	1	4	50	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
20	C-14_I	MASTER CP	0.48	BLOWER 2 AMMETER	0.48	U.S.	1/C	1	4	50	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
21	C-15	JBOX 1A	0.48	MC LEVEL IND. 1A	0.48	U.S.	1/C	1	10	10	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
22	C-15_A	JBOX 1B	0.48	MC LEVEL IND. 1B	0.48	U.S.	1/C	1	10	10	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
23	C-15_B	JBOX 1C	0.48	MC LEVEL IND. 1C	0.48	U.S.	1/C	1	10	10	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
24	C-15_C	MASTER CP	0.48	RAS PUMP NO.1 DS	0.48	U.S.	1/C	1	8	99	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
25	C-15_D	MASTER CP	0.48	RAS PUMP NO.2 DS	0.48	U.S.	1/C	1	8	99	THWN	50	50	Copper	Conduit	0.7159	0.0444	2.864	0.1775	0.0095	0.0095
26	C-15_E	MASTER CP	0.48	GEAR DRIVE 1 DS	0.48	U.S.	1/C	1	10	90	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
27	C-15_F	MASTER CP	0.48	GEAR DRIVE 2 DS	0.48	U.S.	1/C	1	10	120	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
28	C-15_G	MASTER CP	0.48	BLOWER 3 DS	0.48	U.S.	1/C	1	10	60	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
29	C-15_H	BLOWER 1 AM	0.48	BLOWER 1 DS	0.48	U.S.	1/C	1	4	10	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
30	C-15_J	BLOWER 2 AM	0.48	BLOWER 2 DS	0.48	U.S.	1/C	1	4	10	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081

LV Breakers

	ID Name	On Bus	Base kV	Class	Breaker Mfr	Breaker Style	Cont Current (A)	SC Int kA	Trip	Trip Mfr	Trip Type	Trip Style	Sensor/Frame	Plug/Tap/Trip	LTPU Setting	LTPU Mult	Trip (A)
1	KOHLER GEN	KOHLER GEN	0.48	MCCB	Merlin Gerin	CF250N	250	35	TMGN	Merlin Gerin	COMPACT	CF250N	250 (125-250AT)	250			250
2	MASTER CP 1CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (20AT)	20			20
3	MASTER CP 2CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (20AT)	20			20
4	MASTER CP 3CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (20AT)	20			20
5	MASTER CP 4CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (40AT)	40			40
6	MASTER CP 5CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (40AT)	40			40
7	MASTER CP 6CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (15AT)	15			15
8	MASTER CP 7CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (15AT)	15			15
9	MASTER CP 8CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (70AT)	70			70
10	MASTER CP 9CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (70AT)	70			70
11	MASTER CP 10CB	MASTER CP	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (25AT)	25			25
12	PANEL M-1 020406	PANEL M-1	0.48	MCCB	GE	TEY	100	14	TMGN	GE	E150	TEY	100A (15A)	15			15
13	PANEL M-1 070911	PANEL M-1	0.48	MCCB	GE	TEY	100	14	TMGN	GE	E150	TEY	100A (15A)	15			15
14	PANEL M-1 171921	PANEL M-1	0.48	MCCB	GE	TEY	100	14	TMGN	GE	E150	TEY	100A (60A)	60			60
15	PANEL M-1 MAIN	PANEL M-1	0.48	MCCB	GE	TFK	225	22	TMGN	GE	F225	TFK	225(150-225AT)	225			225
16	RAPIDSAND CP CB6	RAPIDSAND CP	0.48	MCCB	SQD	FAL	150	18	TMGN	SQD	MAG-GARD	FAL	100A-15T	15			15
17	RAPIDSAND CP CB7	RAPIDSAND CP	0.48	MCCB	SQD	FAL	150	18	TMGN	SQD	MAG-GARD	FAL	100A-15T	15			15

LV Breakers

	ID Name	LT Curve	LTD Band	STPU Setting	STPU Band	STPU I2T	STPU (A)	Maint Mode	Inst Setting	Inst (A)
1	KOHLER GEN								10	2500
2	MASTER CP 1CB								Fixed	
3	MASTER CP 2CB								Fixed	
4	MASTER CP 3CB								Fixed	
5	MASTER CP 4CB								Fixed	
6	MASTER CP 5CB								Fixed	
7	MASTER CP 6CB								Fixed	
8	MASTER CP 7CB								Fixed	
9	MASTER CP 8CB								Fixed	
10	MASTER CP 9CB								Fixed	
11	MASTER CP 10CB								Fixed	
12	PANEL M-1 020406								Fixed	
13	PANEL M-1 070911								Fixed	
14	PANEL M-1 171921								Fixed	
15	PANEL M-1 MAIN								Hi	2250
16	RAPIDSAND CP CB6								180	180
17	RAPIDSAND CP CB7								180	180

Switches

	ID Name	Status	On Bus	Base kV	Conn Type	Normal State	Manufacturer	Type	Style	Cont Current (A)	SC Mom kA	SC Test Std	PCC kVA Demand	PCC Isc/ILoad	Comment
1	ASCO ATS:Switch 2	On	ASCO ATS:Load Bus	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			

Fuses

	ID Name	On Bus	Base kV	Conn Type	Manufacturer	Type	Style	TCC Size	SC Int kA
1	MAIN FDS	MAIN FDS	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	300A	200
2	UTILITY FS	BUS-1	12.47	Feeder	Kearney	Fuse Links	T	100	10.7

ATSs

	ID Name	Status	Base kV	Area	Zone	Material	AF Type	AF Solution	Forced To	AF Option	Forced WD	WD Value	Orientation	Source Connection	Model	Comment
1	ASCO ATS	On	0.48	1	1	Other	ATS	Calculate		TCC	Default		Vertical	Source 2 Bus	Switch	

Meters

	ID Name	Status	Bus Connection	Equipment Connection	Type	Metered Equip Type	Metered Equip Name	Association	Site Name	Meter Name	Comment
1	MET-1	On	METER 680627	C-5	PML	Motor					

SCIOTO

Summary

1	Base MVA	10
2	Frequency	60
3	Buses	38
4	MCC Schedules	0
5	Panel Schedules	0
6	Utilities	1
7	Generators	1
8	UPS	0
9	Motors	24
10	Capacitors	0
11	Loads	0
12	Shunts	0
13	Filters	0
14	2-Transformers	1
15	3-Transformers	0
16	Zigzags	0
17	Cables	37
18	Busways	0
19	Xmission Lines	0
20	CL Reactors	0
21	HV Breakers	0
22	LV Breakers	32
23	Switches	1
24	Fuses	2
25	ATS	1
26	Meters	1
27	CTs	0
28	Relays	0
29	Notes	2
30	Lines	0
31	Total Buses/Nodes	39

Buses

	ID Name	Base kV	Bus Rating (A)	Bus Bracing (kA)	Material
1	BACKWASH PMP1 DS	0.48			Other
2	BACKWASH PMP2 DS	0.48			Other
3	BACKWASH PMP3 DS	0.48			Other
4	BACKWASH PMP4 DS	0.48			Other
5	BLOWER-1 JBOX	0.48			Other
6	BLOWER-2 JBOX	0.48			Other
7	BLOWER-3 JBOX	0.48			Other
8	BLOWER-4 JBOX	0.48			Other
9	BLOWER-5 JBOX	0.48			Other
10	BLOWER-6 JBOX	0.48			Other
11	BLOWER-7 JBOX	0.48			Other
12	BUS-1	34.5			Other
13	BUS-2	34.5			Other
14	BUS-3	0.48			Other
15	CLARIFIER 1 DS	0.48			Other
16	CLARIFIER 2 DS	0.48			Other
17	CUMMINS GEN	0.48			Other
18	EF BACK ROOM DS	0.48			Other
19	EF NORTH WEST DS	0.48			Other
20	EF SOUTH WEST DS	0.48			Other
21	EF WEST DS	0.48			Other
22	EFFLUENT PANEL	0.48			Other
23	FLOW EQ PMP 1 DS	0.48			Other
24	FLOW EQ PMP 2 DS	0.48			Other
25	HEATER MIDDLE DS	0.48			Other
26	HEATER NORTH DS	0.48			Other
27	HEATER SOUTH DS	0.48			Other
28	INFLUENT PANEL	0.48			Other
29	LTG PNL	0.48			Other
30	MAIN FDS	0.48			Other
31	MCC-1	0.48			Other
32	MCC-2	0.48			Other
33	METER 321095848	0.48			Other
34	RAS PUMP #1 DS	0.48			Other
35	RAS PUMP #2 DS	0.48			Other
36	RAS PUMP #3 DS	0.48			Other
37	RAS PUMP #4 DS	0.48			Other
38	SCREW PRESS CP	0.48			Other

Utilities

	ID Name	To bus	Base kV	Util kV	Fault Unit	3Ph SC1	3Ph SC2	SLG SC1	SLG SC2
1	AEP	BUS-1	34.5	34.5	kA	2.8	4.09	2.374	2.65

Generators

	ID Name	Status	To bus	Base kV	Gen kV	Conn	MVA	Type	Power Factor	Efficiency	RPM	X/R	X"dv	X'dv	X0
1	CUMMINS GE	On	CUMMINS GE	0.48	0.48	YG	0.231	SYN-S	0.8	0.95	3600	13.672	17	20	9

2W-Xformers

	ID Name	From bus	From Base kV	From Conn	To Bus	To Base kV	To Conn	Type	Class	Temp	MVA	MVA O/L	Z	Z0	X/R
1	TX #9937008928	BUS-2	34.5	Y	BUS-3	0.48	YG	Oil	OA	65	0.3	0.3	2.6	13	3.759

Cables

	ID Name	From Bus ID	From Base kV	To Bus ID	To Base kV	Unit	Type	No/Ph	Size	Length	Insulation	Rating (A)	75 deg C Rating	Material	Raceway Type	R1	X1	R0	X0	Xc	Xc0
1	C-1	BUS-1	34.5	BUS-2	34.5	U.S.	1/C	1	2	100	XLPES	150		Copper	Conduit	0.1782	0.0641	0.3564	0.1282	0.0522	0.0522
2	C-2	BUS-3	0.48	METER 321095848	0.48	U.S.	1/C	2	250	30	THWN	510	510	Copper	Conduit	0.0486	0.039	0.1944	0.1561	0.0052	0.0052
3	C-3	MAIN FDS	0.48	MCC-1	0.48	U.S.	1/C	2	250	10	THWN	510	510	Copper	Conduit	0.0486	0.039	0.1944	0.1561	0.0052	0.0052
4	C-3_A	ONAN ATS:Loa	0.48	MCC-2	0.48	U.S.	1/C	2	3/0	10	THWN	400	400	Copper	Conduit	0.0705	0.0391	0.2818	0.1566	0.0053	0.0053
5	C-4	CUMMINS GE	0.48	ONAN ATS:Src Bus 2	0.48	U.S.	1/C	2	3/0	60	THWN	400	400	Copper	Conduit	0.0705	0.0391	0.2818	0.1566	0.0053	0.0053
6	C-5	METER 321095	0.48	MAIN FDS	0.48	U.S.	1/C	2	250	60	THWN	510	510	Copper	Conduit	0.0486	0.039	0.1944	0.1561	0.0052	0.0052
7	C-13	MCC-1	0.48	BACKWASH PMP1 DS	0.48	U.S.	1/C	1	10	110	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
8	C-13_A	MCC-1	0.48	BACKWASH PMP2 DS	0.48	U.S.	1/C	1	10	110	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
9	C-13_B	MCC-1	0.48	BLOWER-4 JBOX	0.48	U.S.	1/C	1	3	30	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
10	C-13_C	MCC-2	0.48	FLOW EQ PMP 2 DS	0.48	U.S.	1/C	1	10	140	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
11	C-13_D	MCC-2	0.48	BACKWASH PMP4 DS	0.48	U.S.	1/C	1	10	110	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
12	C-13_E	MCC-2	0.48	CLARIFIER 1 DS	0.48	U.S.	1/C	1	10	300	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
13	C-15_AA	LTG PNL	0.48	HEATER MIDDLE DS	0.48	U.S.	1/C	1	10	75	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
14	C-15_C	MCC-1	0.48	BACKWASH PMP3 DS	0.48	U.S.	1/C	1	10	110	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
15	C-15_D	MCC-1	0.48	BLOWER-7 JBOX	0.48	U.S.	1/C	1	10	30	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
16	C-15_E	MCC-1	0.48	ONAN ATS:Src Bus 1	0.48	U.S.	1/C	1	500	20	THWN	380	380	Copper	Conduit	0.0261	0.0372	0.1045	0.149	0.0038	0.0038
17	C-15_F	MCC-1	0.48	BLOWER-5 JBOX	0.48	U.S.	1/C	1	3	30	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
18	C-15_G	MCC-1	0.48	BLOWER-6 JBOX	0.48	U.S.	1/C	1	3	30	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
19	C-15_H	MCC-2	0.48	CLARIFIER 2 DS	0.48	U.S.	1/C	1	10	300	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
20	C-15_I	MCC-2	0.48	RAS PUMP #1 DS	0.48	U.S.	1/C	1	10	200	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
21	C-15_J	MCC-2	0.48	RAS PUMP #4 DS	0.48	U.S.	1/C	1	10	200	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
22	C-15_K	MCC-2	0.48	BLOWER-1 JBOX	0.48	U.S.	1/C	1	3	30	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
23	C-15_L	MCC-2	0.48	RAS PUMP #3 DS	0.48	U.S.	1/C	1	10	200	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
24	C-15_M	MCC-2	0.48	RAS PUMP #2 DS	0.48	U.S.	1/C	1	10	200	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
25	C-15_N	MCC-2	0.48	BLOWER-3 JBOX	0.48	U.S.	1/C	1	3	30	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
26	C-15_O	MCC-2	0.48	LTG PNL	0.48	U.S.	1/C	1	3	20	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
27	C-15_P	MCC-2	0.48	BLOWER-2 JBOX	0.48	U.S.	1/C	1	3	30	THWN	100	100	Copper	Conduit	0.2247	0.0417	0.8987	0.167	0.0074	0.0074
28	C-15_Q	MCC-2	0.48	SCREW PRESS CP	0.48	U.S.	1/C	1	10	40	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
29	C-15_R	MCC-2	0.48	EFFLUENT PANEL	0.48	U.S.	1/C	1	4	96	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
30	C-15_S	MCC-2	0.48	FLOW EQ PMP 1 DS	0.48	U.S.	1/C	1	10	140	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
31	C-15_T	MCC-2	0.48	INFLUENT PANEL	0.48	U.S.	1/C	1	4	50	THWN	85	85	Copper	Conduit	0.2832	0.0427	1.133	0.1708	0.0081	0.0081
32	C-15_U	LTG PNL	0.48	EF BACK ROOM DS	0.48	U.S.	1/C	1	10	72	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
33	C-15_V	LTG PNL	0.48	EF SOUTH WEST DS	0.48	U.S.	1/C	1	10	65	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
34	C-15_W	LTG PNL	0.48	EF WEST DS	0.48	U.S.	1/C	1	10	151	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
35	C-15_X	LTG PNL	0.48	HEATER SOUTH DS	0.48	U.S.	1/C	1	10	75	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
36	C-15_Y	LTG PNL	0.48	EF NORTH WEST DS	0.48	U.S.	1/C	1	10	208	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081
37	C-15_Z	LTG PNL	0.48	HEATER NORTH DS	0.48	U.S.	1/C	1	10	75	THWN	35	35	Copper	Conduit	1.139	0.0427	4.557	0.1708	0.0081	0.0081

LV Breakers

	ID Name	On Bus	Base kV	Class	Breaker Mfr	Breaker Style	Cont Current (A)	SC Int kA	Trip	Trip Mfr	Trip Type	Trip Style	Sensor/Frame	Plug/Tap/Trip	LTPU Setting	LTPU Mult	Trip (A)
1	CUMMINS GEN	CUMMINS GEN	0.48	MCCB	(Generic)	400 AF	400	35	TMGN	(Generic)	Std	400 AF	400A (175AT)	175			175
2	LTG PNL 02-04-06	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A (15AT)	15			15
3	LTG PNL 08-10-12	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A (15AT)	15			15
4	LTG PNL 13-15-17	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A (15AT)	15			15
5	LTG PNL 14-16-18	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A (15AT)	15			15
6	LTG PNL 20-22-24	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A(30AT)	30			30
7	LTG PNL 25-27-29	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A(30AT)	30			30
8	LTG PNL 26-28-30	LTG PNL	0.48	MCCB	SQD	EDB	125	18	TMGN	SQD	(Std)	EDB	125A(30AT)	30			30
9	MCC-1 1A	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
10	MCC-1 1B	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
11	MCC-1 1C	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (100AT)	100			100
12	MCC-1 2A	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
13	MCC-1 2B	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
14	MCC-1 2D	MCC-1	0.48	MCCB	SQD	LHL	400	35	TMGN	SQD	MAG-GARD	LHL	400A-400T22M	400			400
15	MCC-1 3A	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (100AT)	100			100
16	MCC-1 4A	MCC-1	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (100AT)	100			100
17	MCC-2 1E	MCC-2	0.48	MCCB	SQD	FHP	100	25	TMGN	SQD	F Frame	FHP	100A (80AT)	80			80
18	MCC-2 1F	MCC-2	0.48	MCCB	SQD	FHP	100	25	TMGN	SQD	F Frame	FHP	100A (80AT)	80			80
19	MCC-2 2A	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
20	MCC-2 2B	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
21	MCC-2 2C	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
22	MCC-2 2D	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
23	MCC-2 2E	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
24	MCC-2 3A	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
25	MCC-2 3B	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
26	MCC-2 3C	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (100AT)	100			100
27	MCC-2 4A	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
28	MCC-2 4B	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (15AT)	15			15
29	MCC-2 4C	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (100AT)	100			100
30	MCC-2 5A	MCC-2	0.48	MCCB	SQD	FAP	100	18	TMGN	SQD	F Frame	FAP	100A (100AT)	100			100
31	MCC-2 5C	MCC-2	0.48	MCCB	SQD	FHP	100	25	TMGN	SQD	F Frame	FHP	100A (100AT)	100			100
32	MCC-2 5D	MCC-2	0.48	MCCB	SQD	FAL	100	18	TMGN	SQD	(Std)	FAL	100A (15AT)	15			15

LV Breakers

	ID Name	LT Curve	LTD Band	STPU Setting	STPU Band	STPU I2T	STPU (A)	Maint Mode	Inst Setting	Inst (A)
1	CUMMINS GEN								1750	1750
2	LTG PNL 02-04-06								Fixed	
3	LTG PNL 08-10-12								Fixed	
4	LTG PNL 13-15-17								Fixed	
5	LTG PNL 14-16-18								Fixed	
6	LTG PNL 20-22-24								Fixed	
7	LTG PNL 25-27-29								Fixed	
8	LTG PNL 26-28-30								Fixed	
9	MCC-1 1A								Fixed	
10	MCC-1 1B								Fixed	
11	MCC-1 1C								Fixed	
12	MCC-1 2A								Fixed	
13	MCC-1 2B								Fixed	
14	MCC-1 2D								500	500
15	MCC-1 3A								Fixed	
16	MCC-1 4A								Fixed	
17	MCC-2 1E								Fixed	
18	MCC-2 1F								Fixed	
19	MCC-2 2A								Fixed	
20	MCC-2 2B								Fixed	
21	MCC-2 2C								Fixed	
22	MCC-2 2D								Fixed	
23	MCC-2 2E								Fixed	
24	MCC-2 3A								Fixed	
25	MCC-2 3B								Fixed	
26	MCC-2 3C								Fixed	
27	MCC-2 4A								Fixed	
28	MCC-2 4B								Fixed	
29	MCC-2 4C								Fixed	
30	MCC-2 5A								Fixed	
31	MCC-2 5C								Fixed	
32	MCC-2 5D								Fixed	

Switches

	ID Name	Status	On Bus	Base kV	Conn Type	Normal State	Manufacturer	Type	Style	Cont Current (A)	SC Mom kA	SC Test Std	PCC kVA Demand	PCC Isc/ILoad	Comment
1	ONAN ATS:Switch 1	On	ONAN ATS:Load Bus	0.48	Feeder	Closed	<None>	<None>	<None>	0	0	ANSI-SYM			

Fuses

	ID Name	On Bus	Base kV	Conn Type	Manufacturer	Type	Style	TCC Size	SC Int kA
1	MAIN FDS	MAIN FDS	0.48	Feeder	Ferraz Shawmut	Tri-Onic	TRS	600A	200
2	UTILITY FS	BUS-1	34.5	Feeder	G&W	Padmount	PVI(15-300A)	100	12

ATSs

	ID Name	Status	Base kV	Area	Zone	Material	AF Type	AF Solution	Forced To	AF Option	Forced WD	WD Value	Orientation	Source Connection	Model	Comment
1	ONAN ATS	On	0.48	1	1	Other	ATS	Calculate		TCC	Default		Vertical	Source 1 Bus	Switch	

Meters

	ID Name	Status	Bus Connection	Equipment Connection	Type	Metered Equip Type	Metered Equip Name	Association	Site Name	Meter Name	Comment
1	MET-1	On	METER 321095	C-5	PML	Motor					

APPENDIX B

OECC Utility Fault information for:

MS3
Acct. #106-066-260-1, F-9801
3-Phase Fault (LLL) - 4954
3-Phase Fault (LG) - 3584
X1/R1 - 3.08
X0/R0 - 2.42
LLL-MVA - 108
LG-MVA - 26

MS1
Acct. # 104-911-972-3, F-3101
3-Phase Fault (LLL) - 1551
3-Phase Fault (LG) - 1040
X1/R1 - 2.46
X0/R0 - 2.37
LLL-MVA - 35
LG-MVA - 8

MS2
Acct. #104-866--260-1, F-3101
3-Phase Fault (LLL) - 1582
3-Phase Fault (LG) - 1069
X1/R1 - 2.68
X0/R0 - 2.55
LLL-MVA - 36
LG-MVA - 8

Kirk Oehlman
Customer Services Engineer
AEP Ohio – Columbus Region
850 Tech Center Drive
Gahanna, Ohio 43230

T: 614-883-7931

AEP Ohio Energy Solutions: A unique service for our business customers. Find out more!

This message, including any attachments, contains confidential information intended for a specific individual and purpose, and is protected by law. If you are not the intended recipient, you should delete this message and are hereby notified that any disclosure, copying, or distribution of this message, or taking any action based on it is strictly prohibited.

"Albanese, William" <waalbanese@edg.net>

07/05/2011 05:15 PM

To <kpoehlman@aep.com>
cc "Holtom, Andy" <aholtom@edg.net>, "Crane, Jared" <jscrane@edg.net>
Subject RE: Olentangy Environmental Control Center

From: kpoehlman@aep.com [mailto:kpoehlman@aep.com]
Sent: Wednesday, June 29, 2011 10:23 AM

To: Albanese, William
Cc: Holtom, Andy; Crane, Jared
Subject: Re: Olentangy Environmental Control Center

I have sent your request to the circuit Engineer. The Transformer sizes and locations below are correct.

Kirk Oehlman
Customer Services Engineer
AEP Ohio – Columbus Region
850 Tech Center Drive
Gahanna, Ohio 43230

T: 614-883-7931

AEP Ohio Energy Solutions: A unique service for our business customers. Find out more!

This message, including any attachments, contains confidential information intended for a specific individual and purpose, and is protected by law. If you are not the intended recipient, you should delete this message and are hereby notified that any disclosure, copying, or distribution of this message, or taking any action based on it is strictly prohibited.

"Albanese, William" <waalbanese@edg.net>

06/29/2011 08:31 AM

To <kpoehlman@aep.com>
cc "Crane, Jared" <jscrane@edg.net>, "Holtom, Andy" <aholtom@edg.net>
Subject Olentangy Environmental Control Center

Kirk,

EDG is in the process of performing an Arc-Flash analysis of the Olentangy Environmental Control Center distribution system.

Please provide applicable data, including the available fault current at the secondary bushings, of the three (3) utility transformers feeding the facility.

A previous email indicated the following transformers:
1. 750 KVA at 1849794779720
2. 1000 KVA at 1849617780085
3. 1000 KVA at 1849981780338

Please verify that these are the present transformers.

Thank you,

William Albanese
Sr. Electrical Engineer
EDG, Inc.
Exceptional People - **D**riven by Character - **G**rowing Together
Columbus, OH Office
Office: 614.891.9920 ext 3163
Fax: 614.891.9466

Utility Fault information for:

Meter Number 680 627 827, Transformer #1818621397

This transformer is located at the Tartan Plant, Owned by the Delaware County Water Reclamation Department, at 10811 Manley Drive, Dublin, Ohio.

Jared,

Per your request:

75 KVA, 277/480 V, Z=1.5%

Fault current at xfmr secondary =6000A

Upstream overhead fusing = 100T Kearney

Josh Cross
Account Manager
Ohio Edison Customer Support
jmcross@firstenergycorp.com
Cell: 419-707-4530
Office: 419-521-6177
EFax: 330-245-5718
Subscribe to Ohio Edison Energyline:
A free unique service for our business customers.
Click the link below, sign-up and start exploring!
http://members.questline.com/Login.aspx?accountID=1430

Jared,

This was sent shortly after the first email, this may be what you need more of:

High side fault current at 11811 Manley Rd
PPP=1508
PP=1306
PPG=1370
PG=993
x/r=2.99

Xfmr data
75 KVA 7.2/12.47kV / 277/480 V
Z=1.5%

Upstream overhead fusing = 100T Kearney

Josh Cross
Account Manager
Ohio Edison Customer Support
jmcross@firstenergycorp.com
Cell: 419-707-4530
Office: 419-521-6177
EFax: 330-245-5718
Subscribe to Ohio Edison Energyline:
A free unique service for our business customers.
Click the link below, sign-up and start exploring!
http://members.questline.com/Login.aspx?accountID=1430

Josh,

EDG is in the process of performing an Arc-Flash analysis for a Delaware County Water Treatment Facility, and the electric provider is First Energy.
Please provide utility fuse data (size/model of pole mounted fused cutouts) and available fault current of the utility transformer feeding the plant. Please also provide the Transformer KVA, High Side Voltage, and % Impedance of the transformer as well, if available.

Meter Number 680 627 827, ???KVA, ???/480V Transformer, ???%Z, #1818621397

- This transformer is located at the Tartan Plant, Owned by the Delaware County Water Reclamation Department, at 10811 Manley Drive, Dublin, Ohio.

Thanks, and please give me a call if you have any questions.
Jared Crane

Utility Fault information for:

Meter Number 321 095 848
This transformer is located at the Scioto Plant, Owned by the Delaware County Water Reclamation Department

There is a E fuse - Slow Speed inside our G&W VFI switch.

To <kpoehlman@aep.com>
cc
Subject RE: Fw: EDG, Inc. - Arc Flash Study - Meter# 321 095 848

Frank Brunson
Project Design-Delaware
Lead Engineer
614/883-6810 (Office)
614/315-3707 (Cellular)

"Crane, Jared" <jscrane@edg.net>

07/19/2011 09:52 AM

Thanks Kirk,

Do you know what make & Model the utility fuse is at that point?

Jared Crane
Electrical Engineer
EDG, Inc.
Exceptional People - **D**riven by Character - **G**rowing Together
Columbus, OH Office
Office 614.891.9920 ext. 3166
Cell 614.653.9763
www.edg.net

From: kpoehlman@aep.com [mailto:kpoehlman@aep.com]
Sent: Tuesday, July 19, 2011 9:36 AM
To: Crane, Jared
Subject: Re: Fw: EDG, Inc. - Arc Flash Study - Meter# 321 095 848

Here you go.

LLL - 2800
LG - 2374
X1/R1 - 4.09
X0/R0 - 2.65
LLL - MVA - 159
LG-MVA - 45

Kirk Oehlman
Customer Services Engineer
AEP Ohio – Columbus Region
850 Tech Center Drive
Gahanna, Ohio 43230

T: 614-883-7931

AEP Ohio Energy Solutions: A unique service for our business customers. *Find out more!*

This message, including any attachments, contains confidential information intended for a specific individual and purpose, and is protected by law. If you are not the intended recipient, you should delete this message and are hereby notified that any disclosure, copying, or distribution of this message, or taking any action based on it is strictly prohibited.

APPENDIX C

OPERATING SCENARIOS

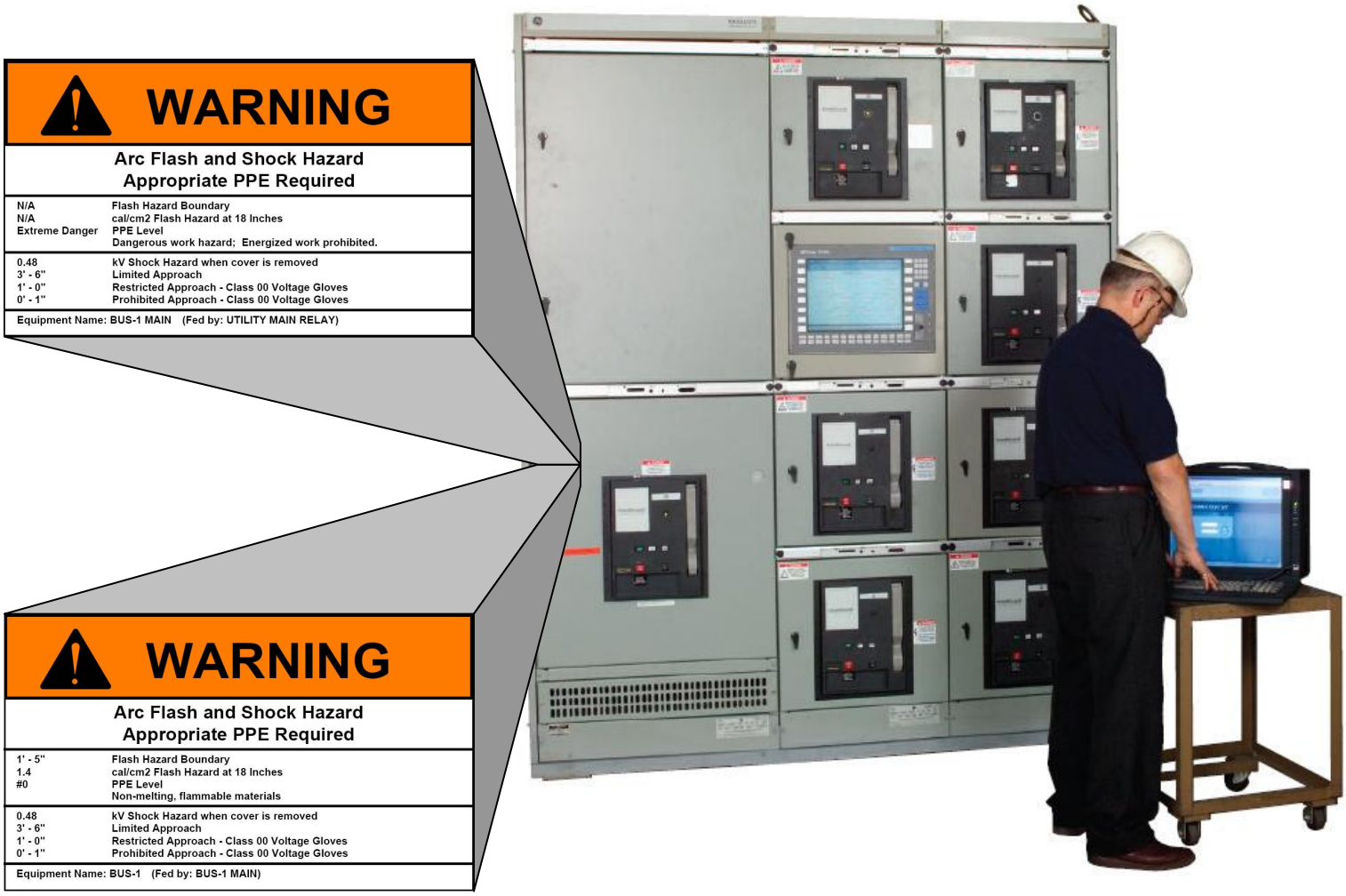
As stated previously, the calculations used in the arc-flash analysis are based upon short circuit current flows. Contribution from large motors, utility feeds, and onsite generation all play a role in the magnitude and duration of the current that can flow in a faulted situation. Experience and studies have shown that smaller magnitude faults many times yield higher values for arc-flash. This is because although a larger magnitude fault will yield a higher value per electrical cycle, the number of electrical cycles is greatly shortened by upstream over-current protection devices (OCPD) clearing the fault. Smaller magnitude faults yield lower values per electrical cycle but have a much longer duration due to delayed clearing time of upstream over current protection devices. Because of this, multiple operating scenarios were looked at to calculate arc-flash energies in several different modes of operation. The most conservative numbers calculated were used.

The operating scenarios are described in the table on the following page.

OECC MS1												
SCENARIO	**GEN1**	**MS1 UTILITY**	**ATS-A1**	**ATS-A2**	**MS1 3C**	**MCCA1 1A**	**MCCD2 3A**	**MCCD1 2B**	**MCCE1 1A**	**MCCE1 1C2**	**MCCE2 1A**	**DESCRIPTION**
BASE	OFF	100%	N	N	C	O	C	O	C	C	O	TYPICAL OPERATION AT 100% FC
2	OFF	125%	N	N	C	O	C	O	C	C	O	TYPICAL OPERATION AT 125% FC
3	OFF	75%	N	N	C	O	C	O	C	C	O	TYPICAL OPERATION AT 75% FC
4	OFF	100%	N	N	C	O	C	O	O	C	C	ALTERNATE OPERATIONS AT 100% FC
5	OFF	100%	N	N	C	O	C	O	C	O	C	
6	OFF	100%	N	N	C	O	O	C	C	O	C	
7	ON	OFF	E	E	O	C	C	O	C	C	O	GENERATOR BACKUP POWER
8	ON	OFF	E	E	O	C	C	O	O	C	C	
9	ON	OFF	E	E	O	C	C	O	C	O	C	
10	ON	OFF	E	E	O	C	O	C	C	O	C	

OECC MS2 & MS3						
SCENARIO	**MS2 UTILITY**	**ATS-S1**	**MS3 UTILITY**	**GEN2**	**ATS B2**	**DESCRIPTION**
BASE	100%	N	100%	OFF	N	TYPICAL OPERATION AT 100% FC
2	125%	N	125%	OFF	N	TYPICAL OPERATION AT 125% FC
3	75%	N	75%	OFF	N	TYPICAL OPERATION AT 75% FC
4	OFF	E	100%	ON	N	GENERATOR BACKUP POWER
5	100%	N	OFF	ON	E	
6	OFF	E	OFF	ON	E	

APPENDIX D



Example Multi Label Equipment

Multi-Label Equipment includes compartmentalized gear having a main breaker. Many times the hazard level is higher when working in the main cubicle than the rest of the feeder breaker cubicles or buckets since the incoming arc-flash value is based upon the upstream OCPD of the main. This is very important and the maintenance personnel must be trained properly to understand how the equipment is labeled.

- The label including the name of the equipment plus the addition of MAIN is a calculated value at the line side of the main breaker. This calculation was made using the upstream OCPD feeding the main of the equipment. This label only applies to energized work being performed within the main breaker cubicle.

- The label, including the name of the equipment, only applies to the feeder breaker cubicles. This label covers all cubicles except the main breaker cubicle. The hazard level for the feeder breaker cubicles is calculated based upon the bus bars within the equipment. This bus is fed to each feeder breaker and is protected by the main breaker. With a selectively coordinated power system the main breaker would clear a fault in less time causing a lower arc-flash hazard.
- Examples at your facility include:
    - MS1
    - MS2
    - MS3

APPENDIX E

AREAS OF EXTREME DANGER

Listed below are locations identified as areas of extreme danger in this study.

1. OECC MS1
    a. ATS-A1
    b. DS2
    c. DS2-MAIN
    d. MCCA1
    e. MCCA2
    f. MCCC
    g. MS1
    h. MS1-2 (MAIN)
2. OECC MS2 & MS3
    a. ATS-S1
    b. GEN2
    c. MCCST1
    d. MCCST2
    e. MCCST2-1A
    f. MS2
    g. MS2-1B
    h. MS3
    i. MS3(EM)
    j. MS3-MAIN
3. TARTAN
    a. KOHLER GEN
4. SCIOTO
    a. CUMMINS GEN
    b. MAIN FDS
    c. METER 321095848

APPENDIX F

OVER-DUTIED EQUIPMENT

Equipment is considered over-dutied when the interrupt rating of the breaker to clear a short circuit, or the short circuit rating of electrical panels, MCC's, or switchgear, has been exceeded by the available fault current of your facility. A piece of equipment trying to clear a fault that is larger than the interrupting duty could fail to open and clear the fault. Over-dutied equipment is a hazard beyond an arc-flash incident. If a fault were to occur at the load side terminals of an over-dutied breaker, the breaker would likely come apart in the form of an explosion sending breaker pieces out as shrapnel.

An investigation or study of the interrupting rating of the electrical equipment was not a part of the scope of work; however, a report is provided showing the fault current at pieces of equipment modeled for the arc-flash audit.

It is our recommendation that over-dutied equipment be further evaluated by conducting a more detailed Short Circuit Analysis. The over-dutied equipment creates a hazardous situation, and if a fault were to occur at the load side terminals of an over-dutied breaker, the breaker would more than likely come apart in the form of an explosion. A detailed Short Circuit Analysis could provide potential solutions to the over-dutied equipment in question.

OECC MS1

Equipment Duty

Comments :

Fault Type: 3 PHASE Vpu: 1.00

Bus		Equipment				Ratings			Duties				Comments
Name	Base kV	ID	Manufacturer	Style	Test Standard	1/2 Cycle kA	Int kA	Int Cycles	1/2 Cycle kA	1/2 Cycle Percent	Int kA	Int Percent	
DS1	0.480	DS1-1H2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.387	-87.1%			
		DS1-1F1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.543	-86.9%			
		DS1-1I1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.387	-87.1%			
		DS1-1H1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.387	-87.1%			
		DS1-1G1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.388	-87.1%			
		DS1-1I2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.386	-87.1%			
		DS1-1G2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.542	-86.9%			
		DS1-1D2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.850	-86.4%			
		DS1-1K MAIN	Cutler Hammer	ND	ANSI-SYM	50.000			5.159	-89.7%			
		DS1-1E1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.837	-86.4%			
		DS1-1B1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.385	-87.1%			
		DS1-1E2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.837	-86.4%			
DS2	0.480	DS2-1C (MAIN)	Cutler Hammer	ND	ANSI-SYM	50.000			0.000	-100.0%			
		DS2-1E ATS-A1	Cutler Hammer	MD	ANSI-SYM	35.000			0.000	-100.0%			
		DS2-1D ATS-A2	Cutler Hammer	MD	ANSI-SYM	35.000			0.000	-100.0%			
		DS2-1F MCC A1	Cutler Hammer	MD	ANSI-SYM	35.000			0.000	-100.0%			
DS2-1C (MAIN)	0.480	DS2-1C (MAIN)	Cutler Hammer	ND	ANSI-SYM	50.000			0.000	-100.0%			
INFLUE PMP1 VFD	0.480	INFLUE PMP1 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.000	-96.0%			
INFLUE PMP2 VFD	0.480	INFLUE PMP2 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.000	-96.0%			
INFLUE PMP3 VFD	0.480	INFLUE PMP3 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.046	-96.0%			
INFLUE PMP4 VFD	0.480	INFLUE PMP4 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.045	-96.0%			
INFLUE PMP5 VFD	0.480	INFLUE PMP5 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.045	-96.0%			
INFLUE PMP6 VFD	0.480	INFLUE PMP6 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.089	-96.0%			
INFLUE PMP7 VFD	0.480	INFLUE PMP7 VFD	BUSS	JKS(J)	ANSI-SYM	200.000			8.087	-96.0%			
MCCA1	0.480	MCCA1-5A	(Generic)	400 AF	ANSI-SYM	35.000			8.188	-76.6%			
		MCCA1-7C	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			9.106	-95.4%			
		MCCA1-7A	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			8.857	-95.6%			
		MCCA1-4D	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			8.833	-95.6%			
		MCCA1-3C	BUSS	FRS-R(RK5).1-12	ANSI-SYM	200.000			9.089	-95.5%			
		MCCA1-3D	Littelfuse	FLSR(RK5)	ANSI-SYM	200.000			9.104	-95.4%			
		MCCA1-4B	Littelfuse	FLSR(RK5)	ANSI-SYM	200.000			9.089	-95.5%			
		MCCA1-4C	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			9.104	-95.4%			
		MCCA1-3A	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			9.106	-95.4%			
		MCCA1-3B	Littelfuse	FLSR(RK5)	ANSI-SYM	200.000			9.089	-95.5%			
MCCA2	0.480	MCCA2-3A	(Generic)	400 AF	ANSI-SYM	35.000			8.117	-76.8%			
		MCCA2-4A	(Generic)	400 AF	ANSI-SYM	35.000			8.118	-76.8%			
		MCCA2-6D	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			9.035	-95.5%			
		MCCA2-5B_A	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.038	-95.5%			
		MCCA2-2D	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			8.620	-95.7%			
		MCCA2-5A	Littelfuse	FLSR(RK5)	ANSI-SYM	200.000			9.021	-95.5%			
		MCCA2-5B	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.038	-95.5%			
		MCCA2-6C	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			9.035	-95.5%			
		MCCA2-5D	BUSS	LPS-RK(RK-1)	ANSI-SYM	200.000			8.480	-95.8%			
		MCCA2-6A	Littelfuse	FLSR(RK5)	ANSI-SYM	200.000			9.021	-95.5%			
		MCCA2-6B	BUSS	FRS-R(RK5).1-12	ANSI-SYM	200.000			9.021	-95.5%			
MCCA3	0.480	MCCA3-1D2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.539	-86.9%			
		MCCA3-1E1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.538	-86.9%			
		MCCA3-1E2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.538	-86.9%			
		MCCA3-1F1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.538	-86.9%			
		MCCA3-1F2	Cutler Hammer	HFD	ANSI-SYM	65.000			8.578	-86.8%			
		MCCA3-1D1	Cutler Hammer	HFD	ANSI-SYM	65.000			8.578	-86.8%			
		MCCA3-2A	Cutler Hammer	HFD	ANSI-SYM	65.000			8.611	-86.8%			
		MCCA3-2B	Cutler Hammer	HFD	ANSI-SYM	65.000			8.611	-86.8%			
		MCCA3-2D	Cutler Hammer	HFD	ANSI-SYM	65.000			8.574	-86.8%			
MCCB	0.480	MCCB-1E	ITE	HE	ANSI-SYM	25.000			7.834	-68.7%			
		MCCB-1C	ITE	HE	ANSI-SYM	25.000			7.862	-68.6%			
		MCCB-1A	Siemens	HED4	ANSI-SYM	42.000			7.834	-81.3%			
MCCB-1A	0.480	MCCB-1A	Siemens	HED4	ANSI-SYM	42.000			7.834	-81.3%			
MCCC	0.480	MCCC MAIN	Siemens	ED4	ANSI-SYM	18.000			6.780	-62.3%			
		MCCC-1C	ITE	HE4	ANSI-SYM	25.000			6.934	-72.3%			
		MCCC-1D	ITE	HE4	ANSI-SYM	25.000			6.981	-72.1%			
		MCCC-2D	ITE	HE4	ANSI-SYM	25.000			6.982	-72.1%			
MCCC MAIN	0.480	MCCC MAIN	Siemens	ED4	ANSI-SYM	18.000			6.780	-62.3%			
MCCD1	0.480	MCCD1-3B	ITE	HE4	ANSI-SYM	25.000			6.490	-74.0%			
		MCCD1-1A	ITE	JL	ANSI-SYM	30.000			6.066	-79.8%			
		MCCD1-4B	GE	TED	ANSI-SYM	25.000			6.490	-74.0%			
		MCCD1-3C	GE	TED	ANSI-SYM	25.000			6.490	-74.0%			
		MCCD1-1D	ITE	HE4	ANSI-SYM	25.000			6.512	-74.0%			
MCCD1-1A	0.480	MCCD1-1A	ITE	JL	ANSI-SYM	30.000			6.066	-79.8%			
MCCD2	0.480	MCCD2-3A	(Generic)	400 AF	ANSI-SYM	35.000			5.767	-83.5%			
		MCCD2-2B	GE	TED (480V)	ANSI-SYM	18.000			5.893	-67.3%			
		MCCD2-2D	(Generic)	400 AF	ANSI-SYM	35.000			5.893	-83.2%			
		MCCD2-2A2	ITE	HE4	ANSI-SYM	25.000			6.019	-75.9%			
MCCD2-3A	0.480	MCCD2-3A	(Generic)	400 AF	ANSI-SYM	35.000			5.767	-83.5%			
MCCE1	0.480	MCCE1-1A	(Generic)	150 AF	ANSI-SYM	25.000			6.591	-73.6%			
MCCE2	0.480	MCCE2-1A	(Generic)	150 AF	ANSI-SYM	25.000			5.109	-79.6%			

Comments :

Fault Type: 3 PHASE Vpu: 1.00

Bus		Equipment				Ratings			Duties				Comments
Name	Base kV	ID	Manufacturer	Style	Test Standard	1/2 Cycle kA	Int kA	Int Cycles	1/2 Cycle kA	1/2 Cycle Percent	Int kA	Int Percent	
MS1	0.480	MS1-3C MCCA1	Cutler Hammer	ND	ANSI-SYM	50.000			7.790	-84.4%			
		MS1-1A (MAIN)	Cutler Hammer	PC	ANSI-SYM	100.000			7.759	-92.2%			
		MS1-3A XFR SW A1	Gould Shawmut	A4BY (L)	ANSI-SYM	200.000			5.837	-97.1%			
		MS1-3B XFR SW A2	BUSS	KTU(L)	ANSI-SYM	200.000			6.466	-96.8%			
MS1-1A (MAIN)	0.480	MS1-1A (MAIN)	Cutler Hammer	PC	ANSI-SYM	100.000			7.759	-92.2%			

OECC MS2 & MS3

Equipment Duty

Comments :

Fault Type: 3 PHASE Vpu: 1.00

Bus		Equipment				Ratings			Duties				Comments
Name	Base kV	ID	Manufacturer	Style	Test Standard	1/2 Cycle kA	Int kA	Int Cycles	1/2 Cycle kA	1/2 Cycle Percent	Int kA	Int Percent	
DPT	0.480	DPT-2_4_6 MAIN	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-7_9_11	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-13_15_17	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-19_21_23	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-25_27_29	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-31_33_35	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-8_10_12	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-14_16_18	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
		DPT-20_22_24	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
DPT-2_4_6 MAIN	0.480	DPT-2_4_6 MAIN	Cutler Hammer	FD	ANSI-SYM	25.000			7.559	-69.8%			
MCCAD	0.480	MCCAD-1G MAIN	Cutler Hammer	HLD	ANSI-SYM	65.000			10.228	-84.3%			
		MCCAD-1D	West	HFD	ANSI-SYM	65.000			10.237	-84.3%			
		MCCAD-1C	West	HFD	ANSI-SYM	65.000			10.237	-84.3%			
		MCCAD-1B	West	HFD	ANSI-SYM	65.000			10.237	-84.3%			
		MCCAD-2A	West	HFD	ANSI-SYM	65.000			10.237	-84.3%			
		MCCAD-2C	West	HFD	ANSI-SYM	65.000			10.237	-84.3%			
		MCCAD-2E	West	HFD	ANSI-SYM	65.000			10.231	-84.3%			
		MCCAD-2D	West	HFD	ANSI-SYM	65.000			10.237	-84.3%			
		MCCAD-2F	West	HFD	ANSI-SYM	65.000			10.235	-84.3%			
		MCCAD-2H1	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			10.237	-94.9%			
		MCCAD-2H2	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			10.237	-94.9%			
		MCCAD-2G1	BUSS	FRS-R(RK5)	ANSI-SYM	200.000			10.237	-94.9%			
MCCAD-1G MAIN	0.480	MCCAD-1G MAIN	Cutler Hammer	HLD	ANSI-SYM	65.000			10.228	-84.3%			
MCCB1	0.480	MCCB1-2C	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.362	-92.8%			
		MCCB1-2D	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.353	-92.8%			
		MCCB1-3A	Ferraz Shawmut	AJT	ANSI-SYM	300.000			13.083	-95.6%			
		MCCB1-4A	Ferraz Shawmut	AJT	ANSI-SYM	300.000			13.085	-95.6%			
		MCCB1-5A	Ferraz Shawmut	AJT	ANSI-SYM	300.000			13.086	-95.6%			
MCCB2	0.480	MCCB2-4A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			12.597	-93.7%			
		MCCB2-3A1	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.294	-92.9%			
		MCCB2-3A2	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.304	-92.8%			
		MCCB2-3B1	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.303	-92.8%			
		MCCB2-1A	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.411	-92.8%			
		MCCB2-2E	Ferraz Shawmut	TRS	ANSI-SYM	200.000			13.066	-93.5%			
		MCCB2-3C1	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.408	-92.8%			
		MCCB2-5A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			12.518	-93.7%			
MCCB3	0.480	MCCB3-5A	West	HFD	ANSI-SYM	65.000			14.161	-78.2%			
		MCCB3-5B	West	HFD	ANSI-SYM	65.000			14.166	-78.2%			
		MCCB3-5C1	West	HFD	ANSI-SYM	65.000			14.161	-78.2%			
		MCCB3-4A1	West	HFD	ANSI-SYM	65.000			14.093	-78.3%			
		MCCB3-4A2	West	HFD	ANSI-SYM	65.000			14.076	-78.3%			
		MCCB3-4B1	West	HFD	ANSI-SYM	65.000			14.075	-78.3%			
		MCCB3-4B2	West	HFD	ANSI-SYM	65.000			14.092	-78.3%			
		MCCB3-4C1	West	HFD	ANSI-SYM	65.000			14.075	-78.3%			
		MCCB3-4C2	West	HFD	ANSI-SYM	65.000			14.076	-78.3%			
		MCCB3-4D1	West	HFD	ANSI-SYM	65.000			14.074	-78.3%			
		MCCB3-4D2	West	HFD	ANSI-SYM	65.000			14.074	-78.3%			
		MCCB3-5C2	West	HFD	ANSI-SYM	65.000			14.168	-78.2%			
		MCCB3-5D	West	HFD	ANSI-SYM	65.000			14.163	-78.2%			
		MCCB3-5E	West	HFD	ANSI-SYM	65.000			14.166	-78.2%			
		MCCB3-5F1	West	HFD	ANSI-SYM	65.000			14.168	-78.2%			
		MCCB3-5F2	West	HFD	ANSI-SYM	65.000			14.168	-78.2%			
		MCCB3-4E1	West	HFD	ANSI-SYM	65.000			14.092	-78.3%			
		MCCB3-6A	West	HFD	ANSI-SYM	65.000			14.161	-78.2%			
		MCCB3-6B	West	HFD	ANSI-SYM	65.000			14.166	-78.2%			
		MCCB3-4E2	West	HFD	ANSI-SYM	65.000			14.075	-78.3%			
		MCCB3-6C2	West	HFD	ANSI-SYM	65.000			14.168	-78.2%			
		MCCB3-6D	West	HFD	ANSI-SYM	65.000			14.163	-78.2%			
		MCCB3-6E	West	HFD	ANSI-SYM	65.000			14.166	-78.2%			
		MCCB3-6F2	West	HFD	ANSI-SYM	65.000			14.168	-78.2%			
		MCCB3-7B	West	HFD	ANSI-SYM	65.000			14.140	-78.2%			
		MCCB3-7C	West	HFD	ANSI-SYM	65.000			14.042	-78.4%			
		MCCB3-7E	West	HFD	ANSI-SYM	65.000			14.141	-78.2%			
		MCCB3-4F1	West	HFD	ANSI-SYM	65.000			14.076	-78.3%			
		MCCB3-4F2	West	HFD	ANSI-SYM	65.000			14.093	-78.3%			
		MCCB3-2A	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.151	-92.9%			
		MCCB3-2B	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.161	-92.9%			
		MCCB3-2C	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.161	-92.9%			
		MCCB3-2D	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			
		MCCB3-2E	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			
		MCCB3-2F	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			
		MCCB3-3A	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			
		MCCB3-3B	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			
		MCCB3-3C	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			
		MCCB3-3D	Ferraz Shawmut	TRS	ANSI-SYM	200.000			14.158	-92.9%			

Comments :

Fault Type: 3 PHASE Vpu: 1.00

Bus		Equipment				Ratings			Duties				Comments
Name	Base kV	ID	Manufacturer	Style	Test Standard	1/2 Cycle kA	Int kA	Int Cycles	1/2 Cycle kA	1/2 Cycle Percent	Int kA	Int Percent	
MCCDWB	0.480	MCCDWB-1B	Cutler Hammer	CHKD	ANSI-SYM	65.000			5.698	-91.2%			
		MCCDWB-2A	Cutler Hammer	HMCP	ANSI-SYM	65.000			6.234	-90.4%			
		MCCDWB-2C	Cutler Hammer	HMCP	ANSI-SYM	65.000			6.234	-90.4%			
		MCCDWB-2D1	West	HFD	ANSI-SYM	65.000			6.237	-90.4%			
		MCCDWB-2D2	West	HFD	ANSI-SYM	65.000			6.237	-90.4%			
		MCCDWB-3A	Cutler Hammer	HMCP	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-3B	Cutler Hammer	HMCP	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-3C1	West	HFD	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-3C2	West	HFD	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-4A	Cutler Hammer	HMCP	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-4B1	West	HFD	ANSI-SYM	65.000			6.237	-90.4%			
		MCCDWB-4B2	West	HFD	ANSI-SYM	65.000			6.237	-90.4%			
		MCCDWB-4C1	West	HFD	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-4C2	West	HFD	ANSI-SYM	65.000			6.225	-90.4%			
		MCCDWB-4D1	West	HFD	ANSI-SYM	65.000			6.175	-90.5%			
		MCCDWB-4D2	West	HFD	ANSI-SYM	65.000			6.237	-90.4%			
		MCCDWB-5A	West	HFD	ANSI-SYM	65.000			5.851	-91.0%			
MCCDWB-1B	0.480	MCCDWB-1B	Cutler Hammer	CHKD	ANSI-SYM	65.000			5.698	-91.2%			
MCCST1	0.480	MCCST1-6A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			8.810	-95.6%			
		MCCST1-2C	Gould Shawmut	A6D (RK1)	ANSI-SYM	200.000			9.424	-95.3%			
		MCCST1-2D	Gould Shawmut	A6D (RK1)	ANSI-SYM	200.000			9.424	-95.3%			
		MCCST1-2E	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.363	-95.3%			
		MCCST1-3B1	Ferraz Shawmut	TRS	ANSI-SYM	200.000			9.464	-95.3%			
		MCCST1-3B2	Ferraz Shawmut	TRS	ANSI-SYM	200.000			9.464	-95.3%			
		MCCST1-4A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			8.214	-95.9%			
		MCCST1-5A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			8.212	-95.9%			
MCCST2	0.480	MCCST2-1A	West	PCF	ANSI-SYM	100.000			4.840	-95.2%			
		MCCST2-2A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			8.861	-95.6%			
		MCCST2-3A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			8.869	-95.6%			
		MCCST2-4A	Gould Shawmut	AJT(J)	ANSI-SYM	200.000			8.270	-95.9%			
		MCCST2-5A	Littelfuse	JTD_ID(J)	ANSI-SYM	200.000			8.208	-95.9%			
		MCCST2-6B	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.515	-95.2%			
		MCCST2-6C	Ferraz Shawmut	TRS	ANSI-SYM	200.000			9.525	-95.2%			
		MCCST2-6E	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.476	-95.3%			
		MCCST2-7A	BUSS	FRS-R(0.1-12A)	ANSI-SYM	200.000			9.520	-95.2%			
		MCCST2-7B	BUSS	FRS-R(0.1-12A)	ANSI-SYM	200.000			9.521	-95.2%			
		MCCST2-7C	BUSS	FRS-R(0.1-12A)	ANSI-SYM	200.000			9.508	-95.2%			
		MCCST2-8A	BUSS	FRS-R(0.1-12A)	ANSI-SYM	200.000			9.521	-95.2%			
		MCCST2-8B	BUSS	FRS-R(0.1-12A)	ANSI-SYM	200.000			9.519	-95.2%			
		MCCST2-8C	BUSS	FRS-R(0.1-12A)	ANSI-SYM	200.000			9.519	-95.2%			
		MCCST2-8D	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.508	-95.2%			
		MCCST2-8E	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.519	-95.2%			
		MCCST2-8F	Gould Shawmut	TRS(RK5)	ANSI-SYM	200.000			9.519	-95.2%			
		MCCST2-9B	BUSS	FRS-R(RK5)	ANSI-SYM	200.000			9.468	-95.3%			
		MCCST2-9C	BUSS	FRS-R(RK5)	ANSI-SYM	200.000			9.468	-95.3%			
		MCCST2-9D	BUSS	FRS-R(RK5)	ANSI-SYM	200.000			9.508	-95.2%			
		MCCST2-9E	BUSS	FRS-R(RK5)	ANSI-SYM	200.000			8.999	-95.5%			
MCCST2-1A	0.480	MCCST2-1A	West	PCF	ANSI-SYM	100.000			4.840	-95.2%			
MCCT	0.480	MCCT-1E	Cutler Hammer	KD	ANSI-SYM	35.000			7.853	-77.6%			
		MCCT-2C	Cutler Hammer	HFD	ANSI-SYM	65.000			7.880	-87.9%			
		MCCT-2B	Cutler Hammer	HFD	ANSI-SYM	65.000			7.875	-87.9%			
		MCCT-1A	Cutler Hammer	HFD	ANSI-SYM	65.000			7.903	-87.8%			
		MCCT-2A	Cutler Hammer	HFD	ANSI-SYM	65.000			7.903	-87.8%			
MCCT-1E	0.480	MCCT-1E	Cutler Hammer	KD	ANSI-SYM	35.000			7.853	-77.6%			
MS2	0.480	MS2-1B	Cutler-Hammer	DSII-632	ANSI-SYM	65.000			7.784	-88.0%			
		MS2-2A	Cutler-Hammer	DSII-616	ANSI-SYM	65.000			6.080	-90.6%			
		MS2-2B	Cutler-Hammer	DSII-616	ANSI-SYM	65.000			4.810	-92.6%			
MS2-1B	0.480	MS2-1B	Cutler-Hammer	DSII-632	ANSI-SYM	65.000			7.784	-88.0%			
MS3	0.480	MS3-2B	Cutler-Hammer	DSII-616	ANSI-SYM	65.000			9.278	-85.7%			
		MS3-2C	Cutler-Hammer	DSII-616	ANSI-SYM	65.000			10.253	-84.2%			
		MS3-IB (MAIN)	Cutler-Hammer	DSII-632	ANSI-SYM	65.000			9.750	-85.0%			
MS3(EM)	0.480	MS3(EM)-1C	Cutler-Hammer	DSII-616	ANSI-SYM	65.000			0.000	-100.0%			
		MS3(EM)-1D	Cutler-Hammer	DSII-616	ANSI-SYM	65.000			0.000	-100.0%			
MS3-1B (MAIN)	0.480	MS3-IB (MAIN)	Cutler-Hammer	DSII-632	ANSI-SYM	65.000			9.750	-85.0%			

TARTAN

Equipment Duty

EasyPower 9.0.200 09/22/11 16:09:13 \...\5210.001 TARTAN ONELINE 07-13-2011.dez

Comments :

Fault Type: 3 PHASE Vpu: 1.00

Bus		Equipment				Ratings			Duties				Comments
Name	Base kV	ID	Manufacturer	Style	Test Standard	1/2 Cycle kA	Int kA	Int Cycles	1/2 Cycle kA	1/2 Cycle Percent	Int kA	Int Percent	
BUS-1	12.470	UTILITY FS	Kearney	T	ANSI-SYM	10.700			508.000	993.5%			VIOLATION
KOHLER GEN	0.480	KOHLER GEN	Merlin Gerin	CF250N	ANSI-SYM	35.000			1.671	-95.2%			
MAIN FDS	0.480	MAIN FDS	Ferraz Shawmut	TRS	ANSI-SYM	200.000			5.714	-97.1%			
MASTER CP	0.480	MASTER CP 1CB	SQD	FAL	ANSI-SYM	18.000			6.072	-66.3%			
		MASTER CP 2CB	SQD	FAL	ANSI-SYM	18.000			6.072	-66.3%			
		MASTER CP 3CB	SQD	FAL	ANSI-SYM	18.000			6.072	-66.3%			
		MASTER CP 4CB	SQD	FAL	ANSI-SYM	18.000			6.036	-66.5%			
		MASTER CP 5CB	SQD	FAL	ANSI-SYM	18.000			6.036	-66.5%			
		MASTER CP 6CB	SQD	FAL	ANSI-SYM	18.000			6.110	-66.1%			
		MASTER CP 7CB	SQD	FAL	ANSI-SYM	18.000			6.110	-66.1%			
		MASTER CP 10CB	SQD	FAL	ANSI-SYM	18.000			6.061	-66.3%			
		MASTER CP 8CB	SQD	FAL	ANSI-SYM	18.000			5.969	-66.8%			
		MASTER CP 9CB	SQD	FAL	ANSI-SYM	18.000			5.969	-66.8%			
PANEL M-1	0.480	PANEL M-1 MAIN	GE	TFK	ANSI-SYM	22.000			6.219	-71.7%			
		PANEL M-1 070911	GE	TEY	ANSI-SYM	14.000			6.331	-54.8%			
		PANEL M-1 171921	GE	TEY	ANSI-SYM	14.000			6.219	-55.6%			
		PANEL M-1 020406	GE	TEY	ANSI-SYM	14.000			6.331	-54.8%			
RAPIDSAND CP	0.480	RAPIDSAND CP CB7	SQD	FAL	ANSI-SYM	18.000			3.030	-83.2%			
		RAPIDSAND CP CB6	SQD	FAL	ANSI-SYM	18.000			3.030	-83.2%			

SCIOTO

Equipment Duty

EasyPower 9.0.200 09/22/11 16:10:22 \...\5210.001 SCIOTO ONELINE 07-13-2011.dez

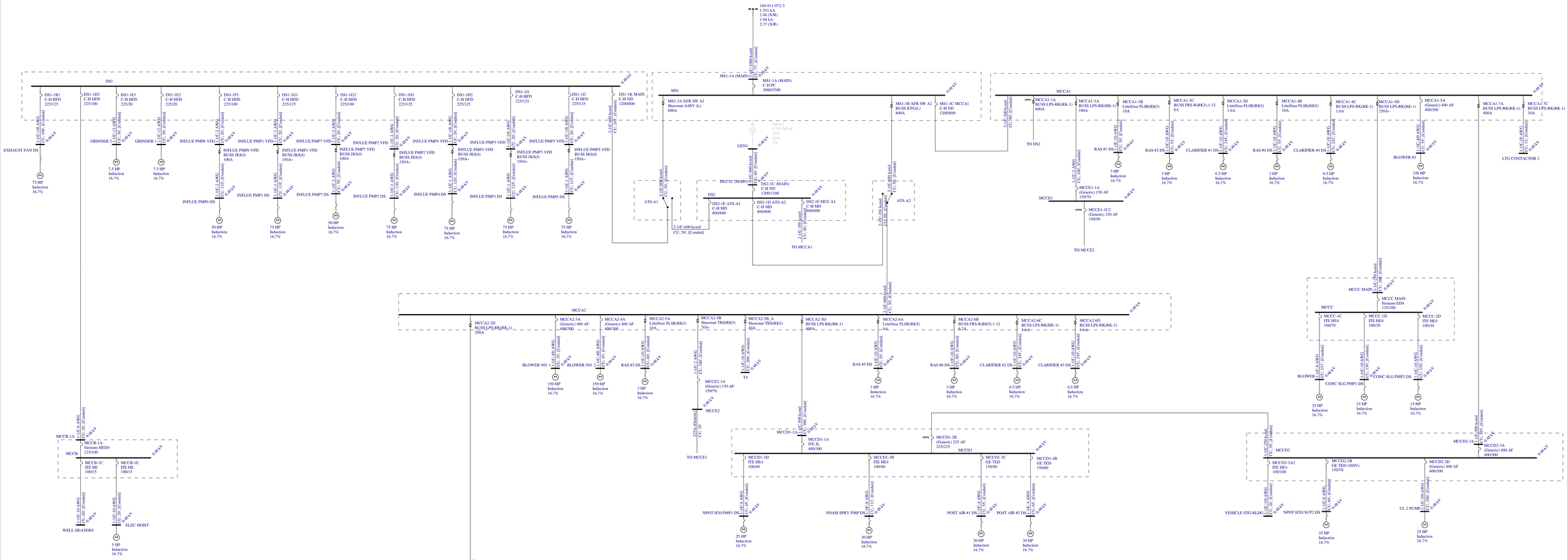
Comments :

Fault Type: 3 PHASE Vpu: 1.00

Bus		Equipment				Ratings			Duties				Comments
Name	Base kV	ID	Manufacturer	Style	Test Standard	1/2 Cycle kA	Int kA	Int Cycles	1/2 Cycle kA	1/2 Cycle Percent	Int kA	Int Percent	
BUS-1	34.500	UTILITY FS	GW	PVI(15-300A)	ANSI-SYM	12.000			2.800	-76.7%			
CUMMINS GEN	0.480	CUMMINS GEN	(Generic)	400 AF	ANSI-SYM	35.000			1.895	-94.6%			
LTG PNL	0.480	LTG PNL 13-15-17	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
		LTG PNL 02-04-06	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
		LTG PNL 08-10-12	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
		LTG PNL 25-27-29	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
		LTG PNL 26-28-30	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
		LTG PNL 20-22-24	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
		LTG PNL 14-16-18	SQD	EDB	ANSI-SYM	18.000			11.387	-36.7%			
MAIN FDS	0.480	MAIN FDS	Ferraz Shawmut	TRS	ANSI-SYM	200.000			11.711	-94.1%			
MCC-1	0.480	MCC-1 1A	SQD	FAP	ANSI-SYM	18.000			13.333	-25.9%			
		MCC-1 1B	SQD	FAP	ANSI-SYM	18.000			13.333	-25.9%			
		MCC-1 1C	SQD	FAP	ANSI-SYM	18.000			13.236	-26.5%			
		MCC-1 2A	SQD	FAP	ANSI-SYM	18.000			13.333	-25.9%			
		MCC-1 2B	SQD	FAP	ANSI-SYM	18.000			13.367	-25.7%			
		MCC-1 2D	SQD	LHL	ANSI-SYM	35.000			12.202	-65.1%			
		MCC-1 3A	SQD	FAP	ANSI-SYM	18.000			13.236	-26.5%			
		MCC-1 4A	SQD	FAP	ANSI-SYM	18.000			13.236	-26.5%			
MCC-2	0.480	MCC-2 2B	SQD	FAP	ANSI-SYM	18.000			12.736	-29.2%			
		MCC-2 2C	SQD	FAP	ANSI-SYM	18.000			12.736	-29.2%			
		MCC-2 2D	SQD	FAP	ANSI-SYM	18.000			12.786	-29.0%			
		MCC-2 2E	SQD	FAP	ANSI-SYM	18.000			12.786	-29.0%			
		MCC-2 3A	SQD	FAP	ANSI-SYM	18.000			12.736	-29.2%			
		MCC-2 3C	SQD	FAP	ANSI-SYM	18.000			12.639	-29.8%			
		MCC-2 4A	SQD	FAP	ANSI-SYM	18.000			12.755	-29.1%			
		MCC-2 3B	SQD	FAP	ANSI-SYM	18.000			12.736	-29.2%			
		MCC-2 4B	SQD	FAP	ANSI-SYM	18.000			12.755	-29.1%			
		MCC-2 5A	SQD	FAP	ANSI-SYM	18.000			12.639	-29.8%			
		MCC-2 5C	SQD	FHP	ANSI-SYM	25.000			12.787	-48.9%			
		MCC-2 4C	SQD	FAP	ANSI-SYM	18.000			12.639	-29.8%			
		MCC-2 5D	SQD	FAL	ANSI-SYM	18.000			12.770	-29.1%			
		MCC-2 1F	SQD	FHP	ANSI-SYM	25.000			12.587	-49.7%			
		MCC-2 2A	SQD	FAP	ANSI-SYM	18.000			12.736	-29.2%			
		MCC-2 1E	SQD	FHP	ANSI-SYM	25.000			12.586	-49.7%			

APPENDIX G

OECC MS1



WARNING!!
One line only Depicts equipment and data modeled for arc-flash hazard analysis

EDG Inc. Consulting Engineers
4151 EXECUTIVE PARKWAY
SUITE 320
WESTERVILLE, OH 43081
PHONE: (614) 891-9920
FAX: (614) 891-9466
WWW.EDG.NET

DELAWARE COUNTY SEWER DISTRICT
MS1

ARC FLASH

DELAWARE COUNTY

JOB NAME: 5210.001	**DRAWN BY:** BA
PLOT DATE: 03-01-2012	**REVISION:** 0

Printed by EasyPower

5210.001 OECC ONELINE 02-21-2012 MS1

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
AERTANK1 MIXER1	0.48	MCCA3-1D1	3.5"	18"	0.1	#0
AERTANK1 MIXER2	0.48	MCCA3-1D1	3.3"	18"	0.1	#0
AERTANK2 MIXER1	0.48	MCCA3-1D2	3.7"	18"	0.2	#0
AERTANK2 MIXER2	0.48	MCCA3-1D2	3.7"	18"	0.2	#0
AERTANK2 MIXER3	0.48	MCCA3-1D2	3.4"	18"	0.1	#0
AERTANK3 MIXER1	0.48	MCCA3-1E1	4.1"	18"	0.2	#0
AERTANK3 MIXER2	0.48	MCCA3-1E1	4"	18"	0.2	#0
AERTANK3 MIXER3	0.48	MCCA3-1E1	3.5"	18"	0.1	#0
AERTANK4 MIXER1	0.48	MCCA3-1E2	4.1"	18"	0.2	#0
AERTANK4 MIXER2	0.48	MCCA3-1E2	4"	18"	0.2	#0
AERTANK4 MIXER3	0.48	MCCA3-1E2	3.4"	18"	0.1	#0
AERTANK5 MIXER1	0.48	MCCA3-1F1	3.7"	18"	0.2	#0
AERTANK5 MIXER2	0.48	MCCA3-1F1	3.4"	18"	0.1	#0
AERTANK5 MIXER3	0.48	MCCA3-1F1	3.3"	18"	0.1	#0
AERTANK6 MIXER1	0.48	MCCA3-1F2	3.5"	18"	0.1	#0
AERTANK6 MIXER2	0.48	MCCA3-1F2	3.3"	18"	0.1	#0
ATS-A1	0.48	MS1-3A XFR SW A1	N/A	18"	N/A	Extreme Danger
ATS-A2	0.48	MS1-3B XFR SW A2	N/A	18"	N/A	Extreme Danger
BLOWER	0.48	MCCC-1C	2.5"	18"	0.1	#0
BLOWER #3	0.48	MCCA1-5A	9.5"	18"	0.6	#0
BLOWER NO. 1	0.48	MCCA2-3A	9.6"	18"	0.6	#0
BLOWER NO. 2	0.48	MCCA2-4A	9.6"	18"	0.6	#0
CL 2 PUMP	0.48	MCCA1-7A	135.8"	18"	23.6	#3
CLARIFIER #1 DS	0.48	MCCA1-3D	1.2"	18"	0.0	#0
CLARIFIER #2 DS	0.48	MCCA2-6C	1.1"	18"	0.0	#0
CLARIFIER #3 DS	0.48	MCCA2-6D	1.1"	18"	0.0	#0
CLARIFIER #4 DS	0.48	MCCA1-4C	1.1"	18"	0.0	#0
CONC SLG PMP1 DS	0.48	MCCC-1D	1.9"	18"	0.1	#0
CONC SLG PMP2 DS	0.48	MCCC-2D	1.7"	18"	0.1	#0
DS1	0.48	DS1-1K MAIN	59.8"	18"	7.0	#2*
DS2	0.48	DS2-1C (MAIN)	N/A	18"	N/A	Extreme Danger
DS2-1C (MAIN)	0.48	NONE	N/A	18"	N/A	Extreme Danger
ELEC HOIST	0.48	MCCB-1A	4.3"	18"	0.2	#0
EXHAUST FAN DS	0.48	DS1-1B1	6.1"	18"	0.3	#0
FOAM SPRY PMP DS	0.48	MCCD1-3B	3.4"	18"	0.1	#0
FUEL TFER PUMP 1	0.48	MCCA3-2A	4.1"	18"	0.2	#0
FUEL TFER PUMP 2	0.48	MCCA3-2B	3.8"	18"	0.2	#0
GEN1 RAD FAN DS	0.48	MCCA3-2D	4.1"	18"	0.2	#0
GRINDER 1	0.48	DS1-1E2	4.2"	18"	0.2	#0

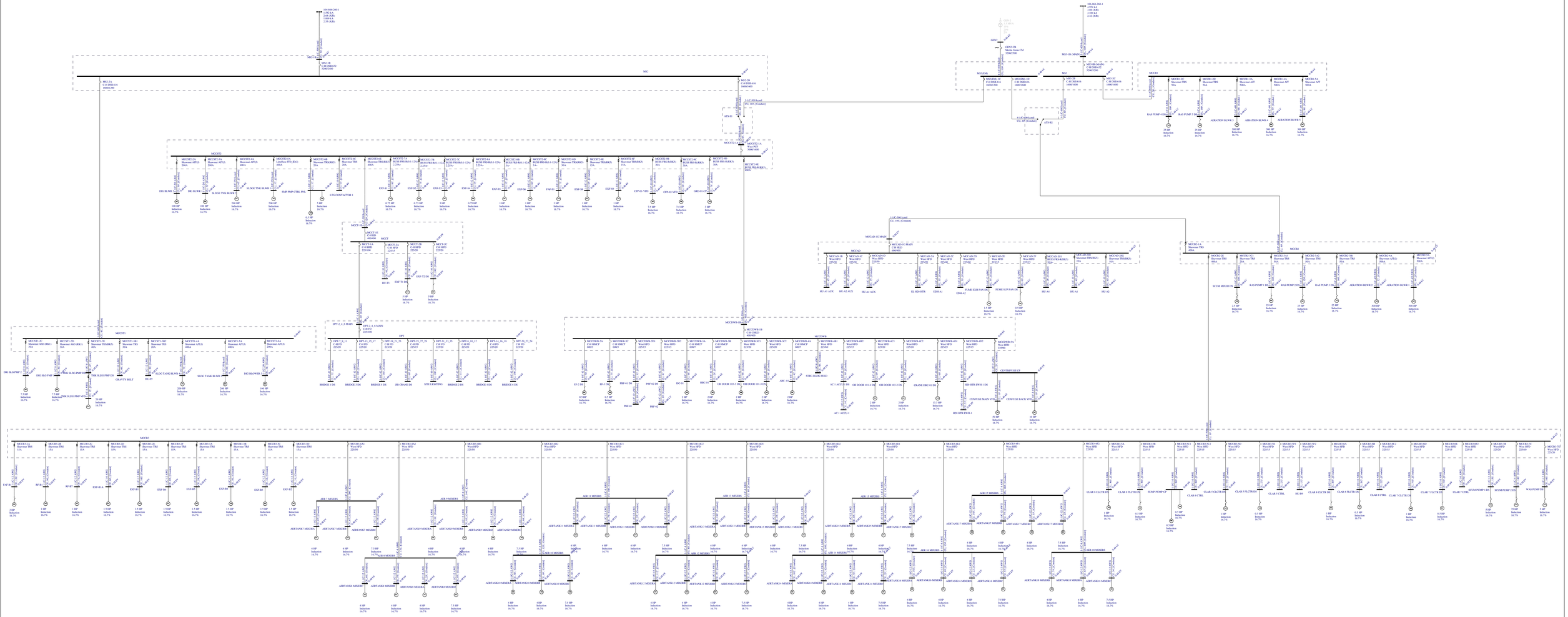
5210.001 OECC ONELINE 02-21-2012 MS1

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
GRINDER 2	0.48	DS1-1E1	4.2"	18"	0.2	#0
INFLUE PMP1 DS	0.48	INFLUE PMP1 VFD	4.4"	18"	0.2	#0
INFLUE PMP1 VFD	0.48	DS1-1G1	6.6"	18"	0.3	#0
INFLUE PMP2 DS	0.48	INFLUE PMP2 VFD	4.5"	18"	0.2	#0
INFLUE PMP2 VFD	0.48	DS1-1H1	6.6"	18"	0.3	#0
INFLUE PMP3 DS	0.48	INFLUE PMP3 VFD	4.5"	18"	0.2	#0
INFLUE PMP3 VFD	0.48	DS1-1I1	6.6"	18"	0.3	#0
INFLUE PMP4 DS	0.48	INFLUE PMP4 VFD	4.5"	18"	0.2	#0
INFLUE PMP4 VFD	0.48	DS1-1H2	6.6"	18"	0.3	#0
INFLUE PMP5 DS	0.48	INFLUE PMP5 VFD	4.6"	18"	0.2	#0
INFLUE PMP5 VFD	0.48	DS1-1I2	6.6"	18"	0.3	#0
INFLUE PMP6 DS	0.48	INFLUE PMP6 VFD	4.4"	18"	0.2	#0
INFLUE PMP6 VFD	0.48	DS1-1F1	6.4"	18"	0.3	#0
INFLUE PMP7 DS	0.48	INFLUE PMP7 VFD	4.7"	18"	0.2	#0
INFLUE PMP7 VFD	0.48	DS1-1G2	6.4"	18"	0.3	#0
LTG CONTACTOR 2	0.48	MCCA1-7C	4.6"	18"	0.2	#0
MCCA1	0.48	MS1-3C MCCA1	N/A	18"	N/A	Extreme Danger
MCCA2	0.48	MS1-3B XFR SW A2	N/A	18"	N/A	Extreme Danger
MCCA3	0.48	MCCA2-2D	5"	18"	0.2	#0
MCCB	0.48	MCCB-1A	5.4"	18"	0.3	#0
MCCB-1A	0.48	DS1-1D2	6.1"	18"	0.3	#0
MCCC	0.48	MCCC MAIN	6.3"	18"	0.3	#0
MCCC MAIN	0.48	MCCA1-4D	6.7"	18"	0.4	#0
MCCD1	0.48	MCCD1-1A	7"	18"	0.3	#0
MCCD1-1A	0.48	MCCA2-5D	72.7"	18"	9.4	#3
MCCD2	0.48	MCCD2-3A	10"	18"	0.6	#0
MCCD2-3A	0.48	MCCA1-7A	86.7"	18"	12.2	#3
MCCE1	0.48	MCCA1-3A	4.2"	18"	0.2	#0
MCCE2	0.48	MCCA2-5B	4.1"	18"	0.2	#0
MS1	0.48	MS1-1A (MAIN)	N/A	18"	N/A	Extreme Danger
MS1-1A (MAIN)	0.48	NONE	N/A	18"	N/A	Extreme Danger
NPOT H20 PMP1 DS	0.48	MCCD1-1D	4.2"	18"	0.2	#0
NPOT H2O SUP2 DS	0.48	MCCD2-2B	91.6"	18"	13.2	#3
POST AIR #1 DS	0.48	MCCD1-1A	5.3"	18"	0.3	#0
POST AIR #2 DS	0.48	MCCD1-1A	5.2"	18"	0.2	#0
RAS #1 DS	0.48	MCCA1-3B	3.3"	18"	0.1	#0
RAS #2 DS	0.48	MCCA1-3C	3.2"	18"	0.1	#0
RAS #3 DS	0.48	MCCA2-5A	3"	18"	0.1	#0
RAS #4 DS	0.48	MCCA1-4B	3.2"	18"	0.1	#0

5210.001 OECC ONELINE 02-21-2012 MS1

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
RAS #5 DS	0.48	MCCA2-6A	3.2"	18"	0.1	#0
RAS #6 DS	0.48	MCCA2-6B	3"	18"	0.1	#0
T4	0.48	MCCA2-5B_A	2.9"	18"	0.1	#0
VEHICLE STG BLDG	0.48	MCCD2-2A2	4.6"	18"	0.2	#0
WELL HEATERS	0.48	MCCB-1A	3.5"	18"	0.1	#0

OECC MS2 & MS3


MS2
MCCB1
MCCB2
MCCB3
MCCB4
MCCB5
MCCB6
MCCB7
MCCB8
MCCB9
MCCB10
MCCB11
MCCB12
MCCB13
MCCB14
MCCB15
MCCB16
MCCB17
MCCB18
MCCB19
MCCB20
MCCB21
MCCB22
MCCB23
MCCB24
MCCB25
MCCB26
MCCB27
MCCB28
MCCB29
MCCB30
MCCB31
MCCB32
MCCB33
MCCB34
MCCB35
MCCB36
MCCB37
MCCB38
MCCB39
MCCB40

5210.001 OECC ONELINE 02-21-2012 MS2 MS3

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
ABC -01	0.48	MCCDWB-4A	3.2"	18"	0.1	#0
AC 1 ACCU-1	0.48	MCCDWB-4B2	3.6"	18"	0.1	#0
AC 1 ACCU-1 DS	0.48	MCCDWB-4B2	4"	18"	0.2	#0
AERATION BLWR 1	0.48	MCCB2-5A	38.2"	18"	3.6	#1
AERATION BLWR 2	0.48	MCCB2-4A	38.3"	18"	3.7	#1
AERATION BLWR 3	0.48	MCCB1-3A	52.8"	18"	5.9	#2*
AERATION BLWR 4	0.48	MCCB1-4A	54.7"	18"	6.2	#2*
AERATION BLWR 5	0.48	MCCB1-5A	56.5"	18"	6.5	#2*
AERTANK7 MIXERA	0.48	MCCB3-4A1	25.4"	18"	2.0	#1
AERTANK7 MIXERB	0.48	MCCB3-4A1	22.4"	18"	1.7	#1
AERTANK7 MIXERC	0.48	MCCB3-4A1	16.4"	18"	1.1	#0
AERTANK8 MIXERA	0.48	MCCB3-4A2	11"	18"	0.6	#0
AERTANK8 MIXERB	0.48	MCCB3-4A2	22.2"	18"	1.6	#1
AERTANK8 MIXERC	0.48	MCCB3-4A2	19.2"	18"	1.3	#1
AERTANK8 MIXERD	0.48	MCCB3-4A2	25.3"	18"	2.0	#1
AERTANK9 MIXERA	0.48	MCCB3-4B1	25.5"	18"	2.0	#1
AERTANK9 MIXERB	0.48	MCCB3-4B1	23.2"	18"	1.7	#1
AERTANK9 MIXERC	0.48	MCCB3-4B1	18.5"	18"	1.3	#1
AERTANK9 MIXERD	0.48	MCCB3-4B1	9"	18"	0.4	#0
AERTANK10 MIXERA	0.48	MCCB3-4B2	20.6"	18"	1.5	#1
AERTANK10 MIXERB	0.48	MCCB3-4B2	16.9"	18"	1.1	#0
AERTANK10 MIXERC	0.48	MCCB3-4B2	10.7"	18"	0.6	#0
AERTANK11 MIXERA	0.48	MCCB3-4C1	22.2"	18"	1.6	#1
AERTANK11 MIXERB	0.48	MCCB3-4C1	17.5"	18"	1.2	#0
AERTANK11 MIXERC	0.48	MCCB3-4C1	12.3"	18"	0.7	#0
AERTANK11 MIXERD	0.48	MCCB3-4C1	2.8"	18"	0.1	#0
AERTANK12 MIXERA	0.48	MCCB3-4C2	22"	18"	1.6	#1
AERTANK12 MIXERB	0.48	MCCB3-4C2	18.3"	18"	1.2	#1
AERTANK12 MIXERC	0.48	MCCB3-4C2	9.9"	18"	0.5	#0
AERTANK12 MIXERD	0.48	MCCB3-4C2	3"	18"	0.1	#0
AERTANK13 MIXERA	0.48	MCCB3-4D1	21.7"	18"	1.6	#1
AERTANK13 MIXERB	0.48	MCCB3-4D1	18.1"	18"	1.2	#1
AERTANK13 MIXERC	0.48	MCCB3-4D1	9.2"	18"	0.4	#0
AERTANK13 MIXERD	0.48	MCCB3-4D1	3"	18"	0.1	#0
AERTANK14 MIXERA	0.48	MCCB3-4D2	21.7"	18"	1.6	#1
AERTANK14 MIXERB	0.48	MCCB3-4D2	16.2"	18"	1.0	#0
AERTANK14 MIXERC	0.48	MCCB3-4D2	11.7"	18"	0.6	#0
AERTANK14 MIXERD	0.48	MCCB3-4D2	2.9"	18"	0.1	#0
AERTANK15 MIXERA	0.48	MCCB3-4E1	20.8"	18"	1.5	#1

5210.001 OECC ONELINE 02-21-2012 MS2 MS3

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
AERTANK15 MIXERB	0.48	MCCB3-4E1	17.8"	18"	1.2	#0
AERTANK15 MIXERC	0.48	MCCB3-4E1	11.3"	18"	0.6	#0
AERTANK16 MIXERA	0.48	MCCB3-4E2	25"	18"	1.9	#1
AERTANK16 MIXERB	0.48	MCCB3-4E2	22.7"	18"	1.7	#1
AERTANK16 MIXERC	0.48	MCCB3-4E2	16.6"	18"	1.1	#0
AERTANK16 MIXERD	0.48	MCCB3-4E2	3.3"	18"	0.1	#0
AERTANK17 MIXERA	0.48	MCCB3-4F1	26.6"	18"	2.1	#1
AERTANK17 MIXERB	0.48	MCCB3-4F1	22.6"	18"	1.7	#1
AERTANK17 MIXERC	0.48	MCCB3-4F1	19"	18"	1.3	#1
AERTANK17 MIXERD	0.48	MCCB3-4F1	11.3"	18"	0.6	#0
AERTANK18 MIXERA	0.48	MCCB3-4F2	22.1"	18"	1.6	#1
AERTANK18 MIXERB	0.48	MCCB3-4F2	24.2"	18"	1.9	#1
AERTANK18 MIXERC	0.48	MCCB3-4F2	16.6"	18"	1.1	#0
ATS-B2	0.48	MS3-2B	78.5"	18"	10.5	#3
ATS-S1	0.48	MS2-2B	N/A	18"	N/A	Extreme Danger
BRIDGE 1 DS	0.48	DPT-7_9_11	2.5"	18"	0.1	#0
BRIDGE 2 DS	0.48	DPT-8_10_12	9.2"	18"	0.5	#0
BRIDGE 3 DS	0.48	DPT-13_15_17	10.1"	18"	0.5	#0
BRIDGE 4 DS	0.48	DPT-14_16_18	11.7"	18"	0.6	#0
BRIDGE 5 DS	0.48	DPT-19_21_23	11.9"	18"	0.7	#0
BRIDGE 6 DS	0.48	DPT-20_22_24	12.5"	18"	0.7	#0
CENFUGE BACK VFD	0.48	MCCDWB-5A	5.3"	18"	0.3	#0
CENFUGE MAIN VFD	0.48	MCCDWB-5A	5.3"	18"	0.3	#0
CENTRIFUGE CP	0.48	MCCDWB-5A	5.4"	18"	0.3	#0
CFP-01-VFD	0.48	MCCST2-9B	2.5"	18"	0.1	#0
CFP-02-VFD	0.48	MCCST2-9C	2.7"	18"	0.1	#0
CLAR 5 CLCTR DS	0.48	MCCB3-5D	9.7"	18"	0.5	#0
CLAR 5 CTRL	0.48	MCCB3-5F1	7.3"	18"	0.3	#0
CLAR 5 FLCTR DS	0.48	MCCB3-5E	9.7"	18"	0.5	#0
CLAR 6 CLCTR DS	0.48	MCCB3-5A	10.8"	18"	0.6	#0
CLAR 6 CTRL	0.48	MCCB3-5C2	9"	18"	0.4	#0
CLAR 6 FLCTR DS	0.48	MCCB3-5B	10.8"	18"	0.6	#0
CLAR 7 CLCTR DS	0.48	MCCB3-6D	11.2"	18"	0.6	#0
CLAR 7 CTRL	0.48	MCCB3-6F2	9.5"	18"	0.5	#0
CLAR 7 FLCTR DS	0.48	MCCB3-6E	11.1"	18"	0.6	#0
CLAR 8 CLCTR DS	0.48	MCCB3-6A	9.3"	18"	0.5	#0
CLAR 8 CTRL	0.48	MCCB3-6C2	2.5"	18"	0.1	#0
CLAR 8 FLCTR DS	0.48	MCCB3-6B	9.3"	18"	0.5	#0
CRANE DBC-01 DS	0.48	MCCDWB-4D1	3.7"	18"	0.1	#0

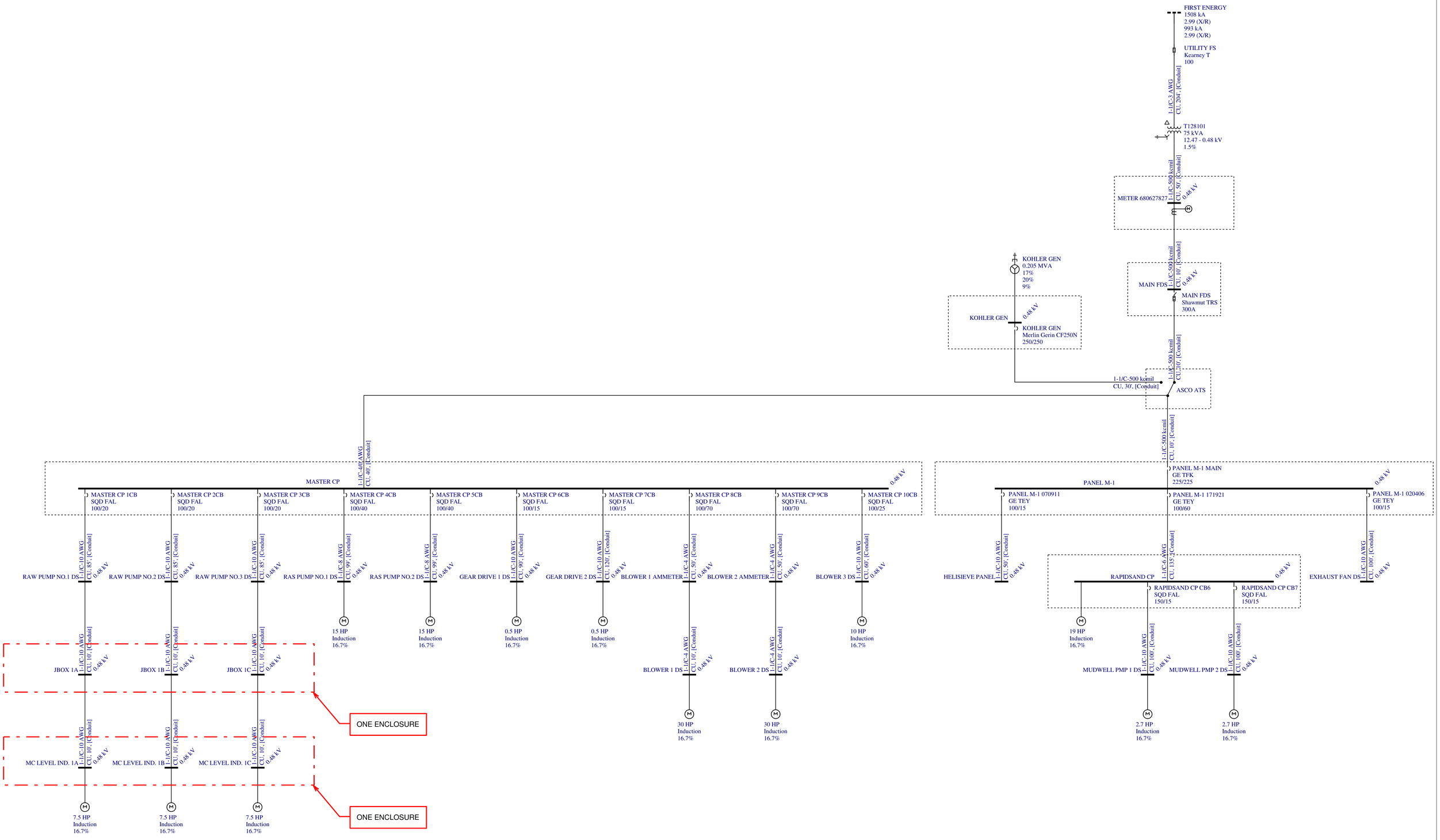
Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
DIG BLOWER 3	0.48	MCCST1-6A	5.6"	18"	0.3	#0
DIG BLWR 1	0.48	MCCST2-3A	5.6"	18"	0.3	#0
DIG BLWR 2	0.48	MCCST2-2A	5.6"	18"	0.3	#0
DIG SLG PMP 1	0.48	MCCST1-2D	3.5"	18"	0.1	#0
DIG SLG PMP 2	0.48	MCCST1-2C	3.6"	18"	0.1	#0
DPT	0.48	DPT-2_4_6 MAIN	6"	18"	0.3	#0
DPT-2_4_6 MAIN	0.48	MCCT-1A	6"	18"	0.3	#0
EDH-A1	0.48	MCCAD-2C	4.7"	18"	0.2	#0
EDH-A2	0.48	MCCAD-2D	4.6"	18"	0.2	#0
EF-2 DS	0.48	MCCDWB-2A	2.1"	18"	0.1	#0
EF-3 DS	0.48	MCCDWB-2C	2.1"	18"	0.1	#0
EL H20 HTR	0.48	MCCAD-2A	2.8"	18"	0.1	#0
EXF-B1	0.48	MCCB3-2E	1.1"	18"	0.0	#0
EXF-B1A	0.48	MCCB3-2D	2.4"	18"	0.1	#0
EXF-B2	0.48	MCCB3-3D	2.7"	18"	0.1	#0
EXF-B3	0.48	MCCB3-3C	2.3"	18"	0.1	#0
EXF-B4	0.48	MCCB3-3B	2.1"	18"	0.1	#0
EXF-B5	0.48	MCCB3-3A	1.9"	18"	0.1	#0
EXF-B6	0.48	MCCB3-2F	1.7"	18"	0.1	#0
EXF-S1	0.48	MCCST2-7A	1.7"	18"	0.1	#0
EXF-S2	0.48	MCCST2-7B	1.8"	18"	0.1	#0
EXF-S3	0.48	MCCST2-7C	2.4"	18"	0.1	#0
EXF-S4	0.48	MCCST2-8A	2.5"	18"	0.1	#0
EXF-S5	0.48	MCCST2-8B	2.5"	18"	0.1	#0
EXF-S6	0.48	MCCST2-8C	2.4"	18"	0.1	#0
EXF-S8	0.48	MCCST2-8E	1.7"	18"	0.1	#0
EXF-S9	0.48	MCCST2-8F	1.6"	18"	0.0	#0
EXF-T1 DS	0.48	MCCT-2B	11.1"	18"	0.6	#0
EXF-T2 DS	0.48	MCCT-2C	11.6"	18"	0.6	#0
FAF-B1	0.48	MCCB3-2A	1.2"	18"	0.0	#0
FAF-S1	0.48	MCCST2-8D	1.8"	18"	0.1	#0
FUME EXH FAN DS	0.48	MCCAD-2E	2.9"	18"	0.1	#0
FUME SUP FAN DS	0.48	MCCAD-2F	2.8"	18"	0.1	#0
GEN2	0.48	NONE	N/A	18"	N/A	Extreme Danger
GRAVTY BELT	0.48	MCCST1-3B1	2.7"	18"	0.1	#0
GRD-01-CP	0.48	MCCST2-9D	2.5"	18"	0.1	#0
H20 HTR EWH-1	0.48	MCCDWB-4D2	2.3"	18"	0.1	#0
H20 HTR EWH-1 DS	0.48	MCCDWB-4D2	3.3"	18"	0.1	#0
HBC-01	0.48	MCCDWB-3B	3.8"	18"	0.2	#0

5210.001 OECC ONELINE 02-21-2012 MS2 MS3

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
HU-A1	0.48	MCCAD-2H1	3.1"	18"	0.1	#0
HU-A1 AUX	0.48	MCCAD-1B	3.1"	18"	0.1	#0
HU-A2	0.48	MCCAD-2H2	3.1"	18"	0.1	#0
HU-A2 AUX	0.48	MCCAD-1C	3.1"	18"	0.1	#0
HU-A4	0.48	MCCAD-2G1	3.2"	18"	0.1	#0
HU-A4 AUX	0.48	MCCAD-1D	3.4"	18"	0.1	#0
HU-B9	0.48	MCCB3-5F2	2.4"	18"	0.1	#0
HU-S9	0.48	MCCST1-3B2	3.1"	18"	0.1	#0
HU-T3	0.48	MCCT-2A	4.5"	18"	0.2	#0
ISC-01	0.48	MCCDWB-3A	3"	18"	0.1	#0
JIB CRANE DS	0.48	DPT-25_27_29	3.2"	18"	0.1	#0
LTG CONTACTOR 1	0.48	MCCST2-6C	3"	18"	0.1	#0
MCCAD	0.48	MCCAD-1G MAIN	9.9"	18"	0.6	#0
MCCAD-1G MAIN	0.48	MCCB2-1A	70.5"	18"	9.0	#3
MCCB1	0.48	MS3-2C	78.4"	18"	10.5	#3
MCCB2	0.48	MS3-2B	78.3"	18"	10.5	#3
MCCB3	0.48	MCCB2-2E	49.6"	18"	5.4	#2*
MCCDWB	0.48	MCCST2-9E	154.1"	18"	28.4	#4
MCCDWB-1B	0.48	MCCST2-9E	154.1"	18"	28.4	#4
MCCST1	0.48	MS2-2A	N/A	18"	N/A	Extreme Danger
MCCST2	0.48	MS2-2B	N/A	18"	N/A	Extreme Danger
MCCST2-1A	0.48	MS2-2B	N/A	18"	N/A	Extreme Danger
MCCT	0.48	MCCST2-6E	86.1"	18"	12.0	#3
MCCT-1E	0.48	MCCST2-6E	86.1"	18"	12.0	#3
MS2	0.48	MS2-1B	N/A	18"	N/A	Extreme Danger
MS2-1B	0.48	NONE	N/A	18"	N/A	Extreme Danger
MS3	0.48	MS3-IB (MAIN)	N/A	18"	N/A	Extreme Danger
MS3(EM)	0.48	GEN2 CB	N/A	18"	N/A	Extreme Danger
MS3-1B (MAIN)	0.48	NONE	N/A	18"	N/A	Extreme Danger
OH DOOR 101-3 DS	0.48	MCCDWB-3C2	2.9"	18"	0.1	#0
OH DOOR 101-4 DS	0.48	MCCDWB-4C1	2.6"	18"	0.1	#0
OH DOOR 103-2 DS	0.48	MCCDWB-4C2	3.9"	18"	0.2	#0
OH DOOR 103-3 DS	0.48	MCCDWB-3C1	2.9"	18"	0.1	#0
PBF-01	0.48	MCCDWB-2D1	3.6"	18"	0.1	#0
PBF-01 DS	0.48	MCCDWB-2D1	3.9"	18"	0.2	#0
PBF-02	0.48	MCCDWB-2D2	3.4"	18"	0.1	#0
PBF-02 DS	0.48	MCCDWB-2D2	3.6"	18"	0.1	#0
RAS PUMP 1 DS	0.48	MCCB2-3A1	2.5"	18"	0.1	#0
RAS PUMP 2 DS	0.48	MCCB2-3A2	2.6"	18"	0.1	#0

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
RAS PUMP 3 DS	0.48	MCCB2-3B1	2.5"	18"	0.1	#0
RAS PUMP 4 DS	0.48	MCCB1-2C	2.6"	18"	0.1	#0
RAS PUMP 5 DS	0.48	MCCB1-2D	2.7"	18"	0.1	#0
RF-B1	0.48	MCCB3-2B	1.5"	18"	0.0	#0
RF-B7	0.48	MCCB3-2C	1.7"	18"	0.1	#0
SCUM MIXER DS	0.48	MCCB2-3C1	1.4"	18"	0.0	#0
SCUM PUMP 1 DS	0.48	MCCB3-7B	11.5"	18"	0.6	#0
SCUM PUMP 2 DS	0.48	MCCB3-7C	4.2"	18"	0.2	#0
SITE LIGHTING	0.48	DPT-31_33_35	3.2"	18"	0.1	#0
SLDG TANK BLWR 3	0.48	MCCST1-5A	26.1"	18"	2.1	#1
SLDG TANK BLWR 4	0.48	MCCST1-4A	27.3"	18"	2.2	#1
SLDGE TNK BLWR 1	0.48	MCCST2-5A	66.5"	18"	8.2	#3
SLDGE TNK BLWR 2	0.48	MCCST2-4A	24.8"	18"	1.9	#1
SMP PMP CTRL PNL	0.48	MCCST2-6B	2.5"	18"	0.1	#0
STRG BLDG FEED	0.48	MCCDWB-4B1	4.3"	18"	0.2	#0
SUMP PUMP CP	0.48	MCCB3-5C1	9.1"	18"	0.4	#0
THK SLDG PMP DS	0.48	MCCST1-2E	4.2"	18"	0.2	#0
THK SLDG PMP VFD	0.48	MCCST1-2E	3.8"	18"	0.2	#0
WAS PUMP DS	0.48	MCCB3-7E	11.9"	18"	0.7	#0

TARTAN



WARNING!!
One line only Depicts equipment and data modeled for arc-flash hazard analysis

EDG Inc. Consulting Engineers
805 HILLSDOWNE ROAD
SUITE B
WESTERVILLE, OH 43081
PHONE: (614) 891-9920
FAX: (614) 891-9466
WWW.EDG.NET

DELAWARE COUNTY
TARTAN FACILITY

ARC FLASH

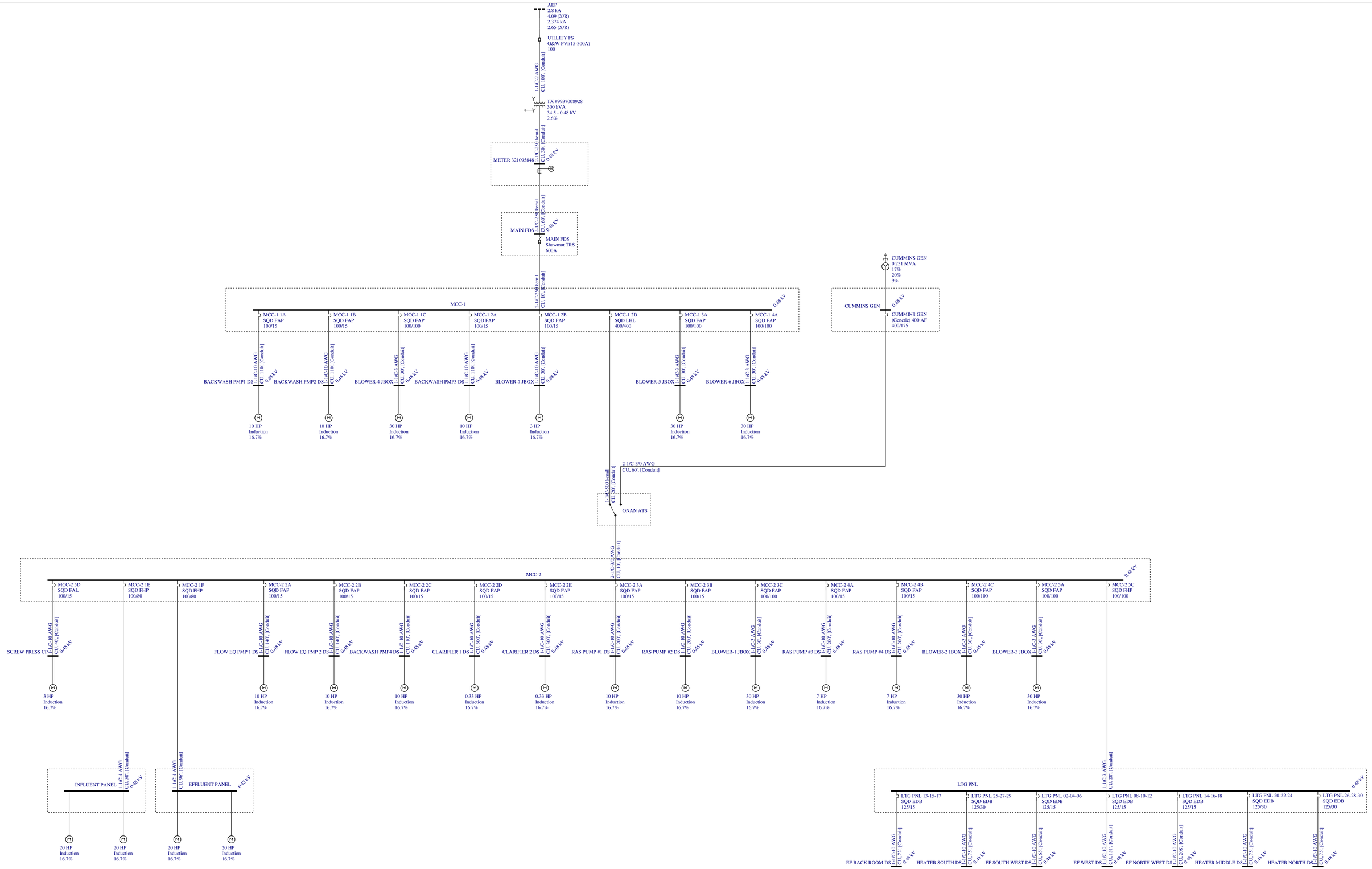
DUBLIN, OHIO

JOB NAME: 5210.01	**DRAWN BY:** EDG, INC.
PLOT DATE: 07-13-2011	**REVISION:** 1

Printed by EasyPower

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
ASCO ATS	0.48	MAIN FDS	79.7"	18"	10.7	#3
BLOWER 1 AMMETER	0.48	MASTER CP 8CB	4.2"	18"	0.2	#0
BLOWER 1 DS	0.48	MASTER CP 8CB	4.1"	18"	0.2	#0
BLOWER 2 AMMETER	0.48	MASTER CP 9CB	4.2"	18"	0.2	#0
BLOWER 2 DS	0.48	MASTER CP 9CB	4.1"	18"	0.2	#0
BLOWER 3 DS	0.48	MASTER CP 10CB	2.9"	18"	0.1	#0
EXHAUST FAN DS	0.48	PANEL M-1 020406	2.3"	18"	0.1	#0
GEAR DRIVE 1 DS	0.48	MASTER CP 6CB	2.4"	18"	0.1	#0
GEAR DRIVE 2 DS	0.48	MASTER CP 7CB	2.2"	18"	0.1	#0
HELISIEVE PANEL	0.48	PANEL M-1 070911	3.1"	18"	0.1	#0
JBOX 1A	0.48	MASTER CP 1CB	2.4"	18"	0.1	#0
JBOX 1B	0.48	MASTER CP 2CB	2.4"	18"	0.1	#0
JBOX 1C	0.48	MASTER CP 3CB	2.4"	18"	0.1	#0
KOHLER GEN	N/A	None	N/A	18"	N/A	Extreme Danger
MAIN FDS	0.48	UTILITY FS	146.4"	18"	26.3	#4
MASTER CP	0.48	MAIN FDS	88.5"	18"	12.5	#3
MC LEVEL IND. 1A	0.48	MASTER CP 1CB	2.3"	18"	0.1	#0
MC LEVEL IND. 1B	0.48	MASTER CP 2CB	2.3"	18"	0.1	#0
MC LEVEL IND. 1C	0.48	MASTER CP 3CB	2.3"	18"	0.1	#0
METER 680627827	0.48	UTILITY FS	147.1"	18"	26.5	#4
MUDWELL PMP 1 DS	0.48	RAPIDSAND CP CB6	1.9"	18"	0.1	#0
MUDWELL PMP 2 DS	0.48	RAPIDSAND CP CB7	1.9"	18"	0.1	#0
PANEL M-1	0.48	PANEL M-1 MAIN	81.3"	18"	11.1	#3
RAPIDSAND CP	0.48	PANEL M-1 171921	16.9"	18"	1.1	#0
RAS PUMP NO.1 DS	0.48	MASTER CP 4CB	2.9"	18"	0.1	#0
RAS PUMP NO.2 DS	0.48	MASTER CP 5CB	2.9"	18"	0.1	#0
RAW PUMP NO.1 DS	0.48	MASTER CP 1CB	2.5"	18"	0.1	#0
RAW PUMP NO.2 DS	0.48	MASTER CP 2CB	2.5"	18"	0.1	#0
RAW PUMP NO.3 DS	0.48	MASTER CP 3CB	2.5"	18"	0.1	#0

SCIOTO



WARNING!!
One line only Depicts equipment and data modeled for arc-flash hazard analysis

EDG Inc. Consulting Engineers
805 HILLSDOWNE ROAD
SUITE B
WESTERVILLE, OH 43081
PHONE: (614) 891-9920
FAX: (614) 891-9466
WWW.EDG.NET

DELAWARE COUNTY
SCIOTO FACILITY

ARC FLASH

POWELL, OHIO

JOB NAME: 5210.01	**DRAWN BY:** EDG, INC.
PLOT DATE: 07-13-2011	**REVISION:** 1

Printed by EasyPower

Arc Fault Bus Name	Arc Fault Bus kV	Upstream Trip Device Name	Est Arc Flash Boundary (inches)	Working Distance (inches)	Incident Energy (cal/cm2)	Required Clothing Class
BACKWASH PMP1 DS	0.48	MCC-1 1A	2.4"	18"	0.1	#0
BACKWASH PMP2 DS	0.48	MCC-1 1B	2.4"	18"	0.1	#0
BACKWASH PMP3 DS	0.48	MCC-1 2A	2.4"	18"	0.1	#0
BACKWASH PMP4 DS	0.48	MCC-2 2C	2.4"	18"	0.1	#0
BLOWER-1 JBOX	0.48	MCC-2 3C	6.5"	18"	0.3	#0
BLOWER-2 JBOX	0.48	MCC-2 4C	6.5"	18"	0.3	#0
BLOWER-3 JBOX	0.48	MCC-2 5A	6.5"	18"	0.3	#0
BLOWER-4 JBOX	0.48	MCC-1 1C	7"	18"	0.4	#0
BLOWER-5 JBOX	0.48	MCC-1 3A	7"	18"	0.4	#0
BLOWER-6 JBOX	0.48	MCC-1 4A	7"	18"	0.4	#0
BLOWER-7 JBOX	0.48	MCC-1 2B	4.7"	18"	0.2	#0
CLARIFIER 1 DS	0.48	MCC-2 2D	2.1"	18"	0.1	#0
CLARIFIER 2 DS	0.48	MCC-2 2E	2.1"	18"	0.1	#0
CUMMINS GEN	N/A	None	N/A	18"	N/A	Extreme Danger
EF BACK ROOM DS	0.48	LTG PNL 13-15-17	2.9"	18"	0.1	#0
EF NORTH WEST DS	0.48	LTG PNL 14-16-18	1.6"	18"	0.0	#0
EF SOUTH WEST DS	0.48	LTG PNL 02-04-06	3"	18"	0.1	#0
EF WEST DS	0.48	LTG PNL 08-10-12	1.9"	18"	0.1	#0
EFFLUENT PANEL	0.48	MCC-2 1F	4.8"	18"	0.2	#0
FLOW EQ PMP 1 DS	0.48	MCC-2 2A	2.1"	18"	0.1	#0
FLOW EQ PMP 2 DS	0.48	MCC-2 2B	2.1"	18"	0.1	#0
HEATER MIDDLE DS	0.48	LTG PNL 20-22-24	2.8"	18"	0.1	#0
HEATER NORTH DS	0.48	LTG PNL 26-28-30	2.8"	18"	0.1	#0
HEATER SOUTH DS	0.48	LTG PNL 25-27-29	2.8"	18"	0.1	#0
INFLUENT PANEL	0.48	MCC-2 1E	5.8"	18"	0.3	#0
LTG PNL	0.48	MCC-2 5C	6.7"	18"	0.4	#0
MAIN FDS	0.48	UTILITY FS	N/A	18"	N/A	Extreme Danger
MCC-1	0.48	MAIN FDS	166.9"	18"	31.9	#4
MCC-2	0.48	MCC-1 2D	7.2"	18"	0.4	#0
METER 321095848	0.48	UTILITY FS	N/A	18"	N/A	Extreme Danger
ONAN ATS	0.48	MCC-1 2D	7.3"	18"	0.4	#0
RAS PUMP #1 DS	0.48	MCC-2 3A	1.7"	18"	0.1	#0
RAS PUMP #2 DS	0.48	MCC-2 3B	1.7"	18"	0.1	#0
RAS PUMP #3 DS	0.48	MCC-2 4A	1.7"	18"	0.1	#0
RAS PUMP #4 DS	0.48	MCC-2 4B	1.7"	18"	0.1	#0
SCREW PRESS CP	0.48	MCC-2 5D	4"	18"	0.2	#0

APPENDIX H

EDG, INC

815 Hillsdowne Rd., Suite B
Westerville, OH 43081

Not updated on this analysis
Changed Setting

By **JSC**
Date **11/17/2011**
Job **5210.001**

OECC MS1
AFHLR

*Setting not adjustable

			Original Settings								Updated Settings							
Curve #:	**Faulted Bus**	**Setting Changed**	**Fuse**	**AMP**	**LTPU**	**LTD**	**STPU**	**STD**	**INST**	**PPE**	**Fuse**	**MCCB Amps**	**LTPU**	**LTD**	**STPU**	**STD**	**INST**	**PPE**
1	MCCD2-3A	Change "MCCA1-7A" 400A Fuse to a 300A Fuse	400	-	-	-	-	-	-	#3	300	-	-	-	-	-	-	#1
2	MCCD2	Breaker "MCCD2-3A" INST Setting	-	300	-	-	-	-	3000	#3	-	300	-	-	-	-	2000	#0
3	CL 2 PUMP									#3								#0
4	NPOT H2O SUP2 DS									#3								#0
5	MCCC MAIN	Updated Settings Reflect Suggested Values for BREAKER "MCCA1-4D"	Not Available							#4	-	400	-	-	-	-	2000	#0
6	MCCD1-1A	No Changes Recommended	-	-	-	-	-	-	-	#3	-	-	-	-	-	-	-	#3
7	MCCE1	Updated Settings Reflect Suggested Values for Fuse "MCCA1-3A"	Not Available							#4	200	-	-	-	-	-	-	#0
8	MS1	No Changes Recommended	-	-	-	-	-	-	-	ED	-	-	-	-	-	-	-	ED

EDG, INC

815 Hillsdowne Rd., Suite B
Westerville, OH 43081

Not updated on this analysis
Changed Setting

By **JSC**
Date **9/29/2011**
Job **5210.001**

OECC MS2 MS3
AFHLR

*Setting not adjustable

			Original Settings								Updated Settings							
Curve #:	**Faulted Bus**	**Setting Changed**	**FUSE**	**Amps**	**LTPU**	**LTD**	**STPU**	**STD**	**INST**	**PPE**	**FUSE**	**Amps**	**LTPU**	**LTD**	**STPU**	**STD**	**INST**	**PPE**
1	MCCAD-1G MAIN	Breakers "MCCB2 NRM FDR" & "MCCB2 STB FDR"	-	1600	1	15	2	0.3	6	#3	-	1600	1	15	2	0.3	2	#1
2	MCCB2									#3								#1
3	ATS 0-1600									#3								#1
4	MCCB1	Breaker "MCCB1 NRM FDR"	-	1600	1	15	2	0.3	6	#3	-	1600	1	15	2	0.3	3	#1
5	MS3	No Changes Recommended	-	-	-	-	-	-	-	ED	-	-	-	-	-	-	-	ED
6	MCCST1	Breaker "MS2-2A"	-	1200	1	15	3	0.3	6	ED	-	1200	1	15	3	0.3	2.5	#1
7	MCCDWB-1B	No Changes Recommended	-	-	-	-	-	-	-	#4	-	-	-	-	-	-	-	#4
8	MCCT	Breaker "MCCT-1E"	-	400	-	-	-	-	10	#3	-	400	-	-	-	-	9	#0
9	MCCT-1E	No Changes Recommended	-	-	-	-	-	-	-	#3	-	-	-	-	-	-	-	#3
10	SLDGE TNK BLWR 1	Fuse "MCCST2-5A	-	400	-	-	-	-	-	#3	-	350	-	-	-	-	-	#1
11	MCCST2	Breaker "MCCST2-1A" Note: A load analysis is recommended before changes in LTPU are made to prevent nuisance trips.	-	1600	1	Fixed	2	Fixed	Fixed	ED	-	1600	0.8	Fixed	2	Fixed	Fixed	#1
12	MCCST2-1A	No Changes Recommended	-	-	-	-	-	-	-	ED	-	-	-	-	-	-	-	ED
13	ATS-S1	No Changes Recommended	-	-	-	-	-	-	-	ED	-	-	-	-	-	-	-	ED
14	MS2	No Changes Recommended	-	-	-	-	-	-	-	ED	-	-	-	-	-	-	-	ED